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GUIDELINES FOR FINANCIAL ANALYSIS OF ROAD PROJECTS

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Guidelines for Financial Analysis of Road Projects

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CONTENTS

S.No.	Description	Page No.
Personnel of the General Specifications & Standards Committee (GSS)		i-ii
Introduction		1
1	**Scope**	3
2	**Time Value of Money**	5
	2.1 Concept of Time Value of Money	5
	2.2 Definition of Commonly Used Terms	5
	2.3 Compounding and Discounting	6
3	**Introduction to Financial Analysis**	8
	3.1 Introduction to Financial Analysis	8
	3.2 An Overview about Public-Private Partnership (PPP)	13
4	**Ratio Analysis**	18
	4.1 Introduction	18
	4.2 Ratio and Ratio Analysis	18
5	**Tools and Techniques of Financial Analysis**	22
	5.1 Capital Budgeting	22
	5.2 Projecting Cash Flows	23
	5.3 Investment Appraisal Techniques	27
6	**Inputs & Assumptions to carry out the Financial Analysis**	38
	6.1 BOT (Toll) Mode	38
	6.2 BOT (Annuity) Mode	44
	6.3 TOT Mode	44
	6.4 Hybrid Annuity Mode (HAM)	45
7	**Value for Money (VFM) Analysis**	58
	7.1 Introduction	58
	7.2 Qualitative VFM Analysis	59
	7.3 Quantitative VFM Analysis	59
	7.4 Value Indicator	61
	7.5 Public Sector Comparator	61
	7.6 Timing of VFM Analysis	62
	7.7 Challenges in VFM Analysis	64
	7.8 Case Study: Madhya Pradesh Road Development Corporation	65
	7.9 Conclusion	66
Annexure 1: Input Data for Financial Analysis		68

List of Tables

Table 2.1: Comparison of Compounding and Discounting 7
Table 2.2: Compound Interest Equations 7
Table 5.1: Advantages and Limitations of Payback Period 30
Table 6.1: Illustration for TPC Calculation in HAM 56
Table 7.1: VFM Analysis by MPRDC 65

List of Figures

Fig. 2.1: Compounding and Discounting 6
Fig. 6.1: Sample Input Sheet for HAM Model 55

List of Boxes

Box 3.1 : Excel Tips and Tricks 9
Box 5.1 : Illustration for Payback Period 28
Box 5.2 : Illustration for Payback Period - Non uniform Cash flows 29
Box 5.3 : Illustration for Payback Reciprocal 30
Box 5.4 : Illustration for Accounting Rate of Return (ARR) 31

LIST OF ABBREVIATIONS

AADT	Annual Average Daily Traffic
BC	Bituminous Concrete
BM	Bituminous Macadam
BOOT	Build-Own-Operate-Transfer
BOT	Build-operate-transfer
CA	Compound Amount
CAPEX	Capital Expenditure
CBA	Cost Benefit Analysis
CF	Congestion Factor
CF_D	Distance-related Congestion Factor
CF_T	Time-Related Congestion Factor
CRF	Capital Recovery Factor
CRRI	Central Road Research Institute
CW	Carriageway
DBM	Dense Bituminous Macadam
EIRR	Economic Internal Rate of Return
ENPV	Economic Net Present Value
FV	Future Value
GSB	Granular Sub Base
HCV	Heavy Commercial Vehicle
HDM	Highway Design and Maintenance Standards Model
IDC	Interest costs During Construction
INR	Indian Rupees
IRC	Indian Roads Congress
IRI	International Roughness Index
IRR	Internal Rate of Return
LA	Land Acquisition
LCV	Light Commercial Vehicle
LVUP	Light Vehicular Underpass

MARR	Minimum Attractive Rate of Return
MAV	Multiple Axle Vehicle
NPV	Net Present Value
OD	Origin - Destination
OPEX	Operational Expenditure
PCU	Passenger Car Units
PMS	Pavement Management System
PV	Present Value
PW	Present Worth
RD	Road Deterioration
RDWE	Road Deterioration and Works Effects
RE	Reinforced Earth
RF	Rise and Fall
RUE	Road User Effects
SCA	Compound Amount Factor of Uniform Series
SDBC	Semi Dense Bituminous Concrete
SEE	Safety, Energy and Environmental Effects
SF	Speed-Flow
SFF	Sinking Fund Factor
SPW	Present Worth Factor of Uniform Series
SPW	Special Publication
SVUP	Small Vehicular Underpass
VDF	Vehicle Damaging Factor
VFM	Value for Money
VOC	Vehicle Operating Cost
VOT	Value of Time
VUP	Vehicular Underpass
WBM	Water Bound Macadam
WE	Works Effects
WMM	Wet Mix Macadam
WPI	Wholesale Price Index

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INTRODUCTION

The Project Preparation, Contract Management, Quality Assurance & Public Private Partnership Committee (G-1) under Convenorship of Shri B. N. Singh, DG (RD) & SS (Retd.), MoRTH felt the necessity to develop the Guidelines for Financial Analysis of Road Projects in its tenure 2018-2020 and accordingly took up the work by constituting a sub-group of Shri Ashok Kumar, Shri R.K. Pandey, Shri D.P. Gupta and Shri M. Kishor Kumar. The initial draft prepared by Sub Group was deliberated upon in numerous meetings of G-1 Committee. The G-1 Committee after exhaustive deliberation on the guidelines and considering its relevance to the present financial implication of road projects approved the guidelines in its meeting held on 24th July, 2021 for placing it before the Council for its approval.

The Composition of Project Preparation, Contract Management, Quality Assurance & Public Private Partnership Committee (G-1) is as given below:

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DG (RD) & SS MoRTH
(Pandey, I.K.)

Secretary General, IRC
(Nirmal, S.K.)

The Draft Guidelines was placed before the GSS Committee in its 1st meeting held on 11th June, 2022 after its reconstitution for 2021-2023 whereby after deliberation, the GSS Committee recommended its submission to the IRC Council for its consideration. The IRC Council in its 222nd meeting held on 17th June, 2022 at Shillong (Meghalaya) after due deliberation approved the guidelines for printing.

CHAPTER 1

SCOPE

This Guideline on Financial Analysis of Road Projects has been prepared for professionals working in the road sector to serve as an essential tool for both the Road Authorities and the Private Investors in financial evaluation of road projects proposed to be undertaken on Public Private Partnership basis.

Assumptions considered in this document may undergo changes due to changes in the market conditions with time. Professionals are advised to undertake a thorough study of the market conditions and prevalent guidelines (prescribed by MoRTH, NHAI, State PWD and State level Road Authorities etc.) while making the assumptions. Some sections of this guidelines have been taken from earlier published documents and manuals while giving due credit to the authors.

Financial Analysis of road projects is carried out to ascertain the financial feasibility of the project from a private investor perspective. It helps assess whether the project yields sufficient returns on investments so that it is attractive to a private investor. It also helps to assess the need of government support (in the form of grant or Viability Gap Funding) for a project to be financially viable. The concepts, tools and techniques used for financial analysis have been brought out. The input assumptions have been discussed to help a professional understand the input variables which go into the financial analysis of a road project.

Value for Money (VFM) Analysis: This type of analysis can also be undertaken side by side in order to ascertain whether the road project being developed through a PPP framework offers good value to the public entity and ultimately to the general public.This is a combination of qualitative and quantitative assessment carried out to make decisions on investment prioritization, selection, and presentation of the choice of procurement approach from government's perspective.The concepts and steps involved in VFM analysis have been explained along with a case study explaining process of VFM analysis.

There is a separate IRC Publication (IRC:SP:30) on Economic Evaluation of Highway Projects and it serves the basic purpose of evaluating whether the project is worthwhile from an economic view point for the socio-economic growth of the country and the region through which the project passes. It helps in ranking of schemes completing for the scarce financial resources of the government.

Difference between Financial and Economic Analysis

Financial and Economic analysis are the techniques used to determine the costs incurred and the resulting benefits from investing in a project. They both involve determining the net present value of a project based on its estimated present and future cash flows, appropriately discounted. Both techniques, however, differ in their implications and hence also in what is defined as a cost

and a benefit in both the techniques. However, the basic difference between both the analysis is that the financial analysis compares benefits and costs to the enterprise, while the economic analysis compares the benefits and costs to the whole economy.

Economic analysis is concerned with the true value a project holds for the society as a whole. It subsumes all members of society, and measures the project's positive and negative impacts. In addition, economic analysis would also cover costs and benefits of goods and services that are not sold in the market and therefore have no market price.

On the other hand financial analysis tends to rely on exact market prices for calculating costs. Taxes are treated as costs (Cash out flow) and subsidies as returns (Cash in flow). They are both assumed to already reflect in these market prices and any adjustments are therefore unnecessary.

In economic analysis, the market price is often modified to arrive at what is popularly known as the 'shadow price' or 'economic price'. Taxes are levied on a project's returns and are collected by the government itself. Similarly, subsidies are funds that society as a whole invests into the project, therefore, necessitating differential treatment.

In financial analysis, one is concerned with the ways and means of financing a project and the financial profitability of the project. Economic analysis which concerns with consequences to all segments of the society, will be necessary in all the projects to establish its economic viability. However even after economic viability of project, Government may not take up the project due to lack of funds or because of the fact that financial analysis has indicated that the returns are not attractive for the funding and recovery procedure selected.

CHAPTER 2

TIME VALUE OF MONEY

2.1 Concept of Time Value of Money

The concept of time value of money is the foundation on which economic and financial analysis is structured. The time value of money is the concept that money available at the present time is worth more than the identical sum in the future due to its potential earning capacity. This core principle of finance holds that, provided money can earn interest, it appreciates in value in course of time. For example, assume that someone offers to pay you one of two options for some work you are doing for them: they will either pay you Rs.1000 now or Rs.1100 one year from now. In this case, if you believe you can make more than a 10% return over the next year, you should opt to be paid Rs.1,000 now.

2.1.1 *Parameters that impact value of money*

There are parameters such as inflation in the economy, risks involved in delayed receipts of cash or financial transactions, and opportunity cost of capital delayed which cause decline in value of money. Hence, the concept of time value of money helps the analyst in reducing all future costs and revenues to a common date and thus evaluate on a common basis.

2.2 Definition of Commonly Used Terms

- **Interest** is defined as the money paid for borrowed money. It also indicates the return obtainable by the productive investment of capital.

- **Interest Rate** is the interest paid or the return obtained at the end of one year, expressed as a percentage of the capital at the beginning of the year. Interest rate can be either simple rate or compound rate.

- **Present Worth** is the present value of a future payment or a series of future payments at the given rate of interest. For example, the present worth of Rs. 673 at the end of twenty years at a compound interest rate of 10% per annum is Rs.100.

- **Discounting** is the process of calculating the present worth of a future payment. Thus, in the above example, Rs.673 at the end of twenty years, when discounted at 10 percent per annum, amounts to Rs.100 at the present time. Discount rate is the interest rate at which future payments are reduced to a common time.

- **Rate of Return** is the term commonly used for the rate at which economic benefits or financial revenues are obtained by a project. While the term interest rate is more commonly used while borrowing capital, this term is more appropriate for economic and financial analysis.

- **Minimum Attractive Rate of Return (MARR)** is that rate of return which must be ensure in any project if it is to be selected for implementation.

- **Net Present Value (NPV)** is the value of all future cash flows (positive and negative) ove the entire life of an investment discounted to the present. NPV analysis helps to determin how much an investment, project, or any series of cash flows is worth at present.

- **Internal Rate of Return (IRR)** is the discount rate that makes NPV of a project zero. In othe words, it is the expected compound annual rate of return that will be earned on a project o investment. Normally, Economic Internal Role of Return (EIRR) is used in economic analysi and Financial Internal Rate of Return (FIRR) in financial analysis.

2.3 Compounding and Discounting (Fig. 2.1)

Compounding and Discounting are two fundamental techniques used for any time value of mone analysis. Compounding method is used to know the future value of present money. Conversely discounting is a way to compute the present value of future money **(Table 2.1)**.

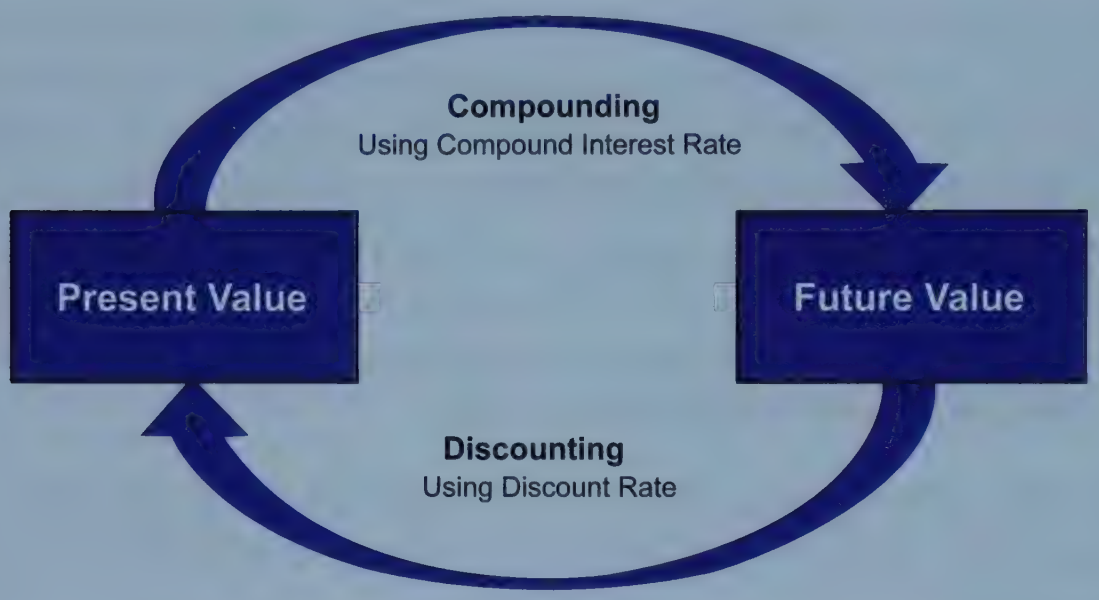


Fig. 2.1 Compounding and Discounting

Compounding is about moving money forward in time. It's the process of determining the futur value of an investment made today and/or the future value of a series of equal payments mad over time (periodic payments).

Discounting is about moving money backwards in time. It's the process of determining th present value of money to be received in the future (as a lump sum and/or as periodic payments Present value is determined by applying a discount rate (opportunity cost) to the sums of mone to be received in the future.

Table 2.1 Comparison of Compounding and Discounting

Basis for Comparison	Compounding	Discounting
Concept	If we invest some money today, what will be the amount we get at a future date	What should be the amount we need to invest today, to get a specific amount in future
Use of	Compound interest rate	Discount rate
Known	Present Value (PV)	Future Value (FV)
Factor	Future Value Factor or Compounding Factor	Present Value Factor or Discounting Factor
Formula	FV = PV (1 + r)^n	PV = FV / (1 + r)^n
FV: Future Value; PV: Present Value; r: compound interest rate / discount rate; n: number of years		

2.3.1 *Compound Interest Equations*

Following **Table 2.2** presents various compound interest equations used for economic and financial analysis:

Table 2.2 Compound Interest Equations

Equation	Use	Factor
$F = P * (1+i)^n$	Given P, to find F	$(1+i)^n$ is Known as Compound Amount (CA) Factor
$P = F / (1+i)^n$ $F = \{(1+i)^n - 1\} / i * A$	Given P, to find F Given A, to find F	$1 / (1+i)^n$ is Known as Present worth (PW) factor of single sum $\{(1+i)^n - 1\} / i$ is known as Compound Amount Factor of uniform series (SCA)
$A = F * i / \{(1+i)^n - 1\}$	Given F, to find A	$i / \{(1+i)^n - 1\}$ is known as Sinking Fund Factor (SFF)
$P = \{(1+i)^n - 1\} / i(1+i)^n * A$	Given A, to find P	$\{(1+i)^n - 1\} / i(1+i)^n$ is known as Present Worth Factor of Uniform Series (SPW)
$A = i(1+i)^n / \{(1+i)^n - 1\} * P$	Given P, to find A	$i(1+i)^n / \{(1+i)^n - 1\}$ is known as Capital Recovery Factor (CRF) of Uniform series

where,

P = present sum of money

i = interest rate (compound) per annum

n = number of years

F = sum of money at a future date

A = end-of-year equal annual payments for n years

For illustration, IRC:SP:30 may be referred.

CHAPTER 3
INTRODUCTION TO FINANCIAL ANALYSIS

3.1 Introduction of Financial Analysis

Financial analysis is the process of evaluating businesses, projects, budgets and other finance-related entities to determine their performance and suitability. Typically, financial analysis is used to analyse whether an entity is stable, solvent, liquid or profitable enough to warrant a monetary investment. When looking at a specific company, a financial analyst conducts analysis by focusing on the income statement, balance sheet, and cash flow statement.

In other words, with respect to a long term project (i.e. the project which consists of capital outlay in the initial years and revenue in the future years) one can say, Financial analysis is the process of assessing the financial viability of the project i.e. whether a Project is financially viable or not.

A financial model is essentially a mathematical representation of a project or an entity's financial operations and statements. It is mainly used to forecast the future financial performance of a project by making appropriate assumptions as to how the particular project can perform in the coming financial years. Along with this, it also acts like a risk management tool for analysing a host of financial economic situations. Financial modeling involves a lot of calculations to provide the final recommendation and projecting the cash flow statements, balance sheet and income statements. This is done with the help of building schedules such as debt schedule, amortization schedule, depreciation schedule and working capital management.

Financial analysis (also referred to as financial statement analysis or accounting analysis or Analysis of finance) refers to an assessment of the viability, stability and profitability of a business, sub-business or project.

Financial analysis may determine if a business will:

- Continue or discontinue its main operation or part of its business;
- Make or purchase certain materials in the manufacture of its product;
- Acquire or rent/lease certain machineries and equipment;
- Issue stocks or negotiate for a bank loan to increase its working capital;
- Make decisions regarding investing or lending capital;
- Make other decisions that allow management to make an informed selection on various alternatives in the conduct of its business

Financial Analysis often assesses the following elements of a Firm/Project:

1. **Profitability** - its ability to earn income and sustain growth in both the short and longterm. A company's degree of profitability is usually based on the income statement, which reports on the company's results of operations;

2. **Solvency** - its ability to pay its obligation to creditors, lenders and other third parties in the long-term;

3. **Liquidity** - its ability to maintain positive cash flow, while satisfying immediate obligations;

   Both 2 and 3 are based on the company's balance sheet, which indicates the financial condition of a business at a given point in time.

4. **Stability** - the firm's ability to remain in business in the long run, without having to sustain significant losses in the conduct of its business. Assessing a company's stability requires the use of both the income statement and the balance sheet, as well as other financial and non-financial indicators. etc.

Financial models are essential tools to help make decisions. These decisions often include: whether or not to invest in a company, asset, or security; whether or not to invest in a project; whether or not to do a merger or acquisitions, and whether or not to raise money; and other corporate finance transactions.

The financial model allows decision makers to test scenarios, observe potential outcomes, and hopefully make an informed decision. There is a lot of talk about software programs that can be used, but the truth is a vast majority of financial modelling takes place in Excel.

Box 3.1 Excel Tips and Tricks

Excel is the main tool used by banks, corporations, and institutions to perform financial modelling. The main reason for this is Excel's phenomenal versatility. Every company or investment opportunity is unique, and Excel is a blank canvas that can be totally customized and tailored to the situation. The flip side of this is that there are no controls or rules in place to ensure the model is accurate and error-free. Here are some of the most important Excel tips for this financial modelling guide:

- Segregate the assumptions and input parameters in one sheet
- Use as many keyboard shortcuts as possible
- Keep formulas and calculations simple – break them down into smaller steps
- Use the grouping function to organize sections of the financial model
- Use F5 (go to special) to quickly locate all hardcoded numbers or formulas
- Use Trace Precedents and Trace Dependents to audit the model

- Use XNPV and XIRR to apply specific dates to cash flows
- Use INDEX MATCH over VLOOKUP for looking up information
- Use a combination of date functions (EOMONTH) and IF statements to make dates dynamic
- Remove gridlines when presenting or sharing the financial model
- Memorize all the most important Excel formulas for financial modelling

3.1.1 *Types of Financial Model*

There are different types of financial models that companies use based on what exactly a company is looking for. There are models which are used for project appraisal, valuation of companies, risk management, portfolio management, etc.

Let us look at some of the financial models that are used in companies and how they can be helpful.

I) Leveraged Buy Out Model

This kind of model is used when a company is looking to acquire and a significant sum of borrowed funds is used to meet the requisite acquisition cost. This kind of model is mostly used by bulge bracket investment firms and sponsors like Private Equity firms who not only want to acquire companies but also want to sell them later at a better profit. Thus in simple terms, this model is used to determine whether or not the sponsor can afford to invest such a big amount and at the same time get the desired return on the investment.

II) Discounted Cash Flow Model

The discounted cash flow model is one of the most widely used financial model across all sectors. It works on a very simple theory that the worth of a business is the sum of its projected future free cash flows, discounted at a suitable rate. It is thus a valuation method which uses free cash flow and discounts to help arrive at a value which will in turn help evaluate the potential of an investment. Investors use this method a lot to understand the absolute value of a company.

III) Option Pricing Model

According to definition, Options are derivative contracts that give a particular holder the right but at the same time not the obligation to buy or sell an underlying instrument at a given price or before a particular future date. Option traders usually lean towards using different option price models to arrive at a current theoretical value. Option pricing model is a kind of financial model that uses certain fixed variables like underlying price, strike, etc and also forecasts for implied volatility. This is usually done to compute the theoretical value for a specified option at a certain point of time. Variables will likely move up or down

over the existence of the option, while the option's theoretical value will adjust to reflect these changes over time.

IV) Sum of the Parts Model

This kind of financial modelling is also known as break-up analysis. In this kind of model the valuation of a company is carried out whereby the value of its divisions are determined (taking into account the fact that the company was being broken down and spun off or they were being acquired by another company).

V) Merger and Acquisition Model

Merger and acquisition model mainly consists of accretion and dilution analysis. The purpose of an acquisition model is essentially to present to the clients the impact of an acquisition to the acquirer's earnings per share and how the changed or new earnings per share after the acquisition will be better or worse. When the earnings per share after the acquisition is higher, it is called accretion while if the opposite happens it will be called dilutive.

VI) Comparative Company Analysis Model

This kind of financial modelling is mainly used by most of the investment banks and can also be called "comparable" or "comps". In this kind of analysis, the major step is that the financial numbers and metrics of a company is compared against similar firms in the industry. A peer group analysis is undertaken for this. It is based on a simple assumption that similar companies would ideally have the same valuation multiples, for example EV/ EBITDA. The process involved includes selecting the peer group of companies, gathering appropriate statistics of the company under view and then comparing them against the peer group.

It can be seen that different kinds of financial modelling techniques are used for different situations. These models essentially help business professionals make the correct decisions with the help of the answers that they derive from such analysis. Applying the right kind of model and gathering the right kind of information for such analysis also forms an important part of the whole process as a single mistake can be detrimental to the health of the company. The analyst should know all the advantages and disadvantages which must be aligned to the company's investment philosophy. Thus financial models give us a deeper understanding of the company and discovers anomalies that an investor would have normally missed. Hence, it is an important tool that can be used time and again to give solutions as and when required.

3.1.2 *Financial modelling best practices*

Over and above good Excel skills, analysts who really stand out at financial modelling are great at structuring and organizing their spreadsheets.

Here are some of the best practices for structuring a model:

- Use color coding to distinguish between inputs and formulas (i.e. blue and black)
- Build a standalone 3 statement model on one worksheet (don't separate the statements onto different sheets)
- Clearly separate the assumptions or drivers from the rest of the model (one section at the top)
- Use clear headers and subheads (with bold shading) to clearly distinguish sections
- Use the cell comments function (shift + F2) to describe calculations or assumptions that need explaining
- Build in error checks such as ensuring the balance sheet balances (without a plug)
- Pull forward (or repeat) information where it helps users follow the logic of the model (i.e. pull forward EBITDA from the income statement to the cash flow valuation section)
- Avoid linking to other Excel workbooks unless absolutely necessary (and if so, clearly indicate those links exist)
- Avoid circular references unless necessary (and use iterative calculation to solve them)
- Use tables, charts and graphs to summarize important information

3.1.3 *Building the forecast*

The "art" of financial modelling mostly relates to making assumptions about the future performance of the business being modelled. This is the most subjective and important part in the valuation of a company.

3.1.4 *Linking the statements*

Once the forecast assumptions are in place, it's just a bunch of basic mathematical operations to fill in the three financial statements in the model. From a financial modelling perspective, this is the least subjective part of the process. With the assumptions clearly stated, an analyst more/ less multiplies, divides, add or subtracts to produce the statements.

- **Step #1** – begin by calculating revenue, based on the forecasting approach used from the above section. From there fill in the revenue, operating expenses, and arrive at earnings before interest taxes depreciation and amortization EBITDA.
- **Step #2** – create supporting schedules for (i) capital assets (PP&E, depreciation, and capital expenditures) and (iii) financing schedules to equity capital, debt balances and interest expense.

- **Step #3** – finish the income statement (depreciation, interest, taxes, net income) and fill in the balance sheet items except for cash, which will be the last part of the financial model to be completed.

- **Step #4** – build the cash flow statement, consisting of cash from operating activities, cash used in investing activities, and cash from financing activities. Combined, these three sections will determine the closing cash balance, which links to the balance sheet to complete the financial model.

This is a simplified overview of the financial modelling process or linking of the three statements.

3.1.5 *Further analysis*

With the baseline financial model in place, it's time to focus on whatever type of financial modelling exercise suits the situation. The most common ones include:

- DCF analysis - discounted cash flow analysis (DCF model) to value a business
- M&A analysis - evaluate the attractiveness of a potential merger, acquisition or divestiture
- LBO analysis - determining how much leverage (debt) can be used to purchase the company
- Sensitivity analysis - layering on a section that evaluates how sensitive the business or the investment is to changes in assumptions or drivers (sensitivity analysis course)

3.1.6 *Presenting the results*

The last step is to develop charts, graphs, and other outputs that can be used to easily communicate the information from the model. This is where the best analysts really get to shine. It's one thing to build a complex model that only you understand, but it's another thing to effectively communicate the risks, rewards, and critical factors to all audiences.

3.2 An Overview about Public-Private Partnership (PPP)

Historically, investments in the infrastructure space, particularly in the highways/expressways etc., were being made by the Government mainly because of the large volume of resources required, long gestation period, and associated externalities. The galloping resource requirements, concern for managerial efficiency and consumer responsiveness have led in recent times to an active involvement of private sector investments.

Under PPP mechanism for road infrastructure, Government earlier offered two models viz. Build - Operate - Transfer (Toll) and Build - Operate - Transfer (Annuity). Most of the projects were awarded on these two models. In recent times, the Government has come up with a new model Hybrid Annuity Mode (HAM) and several projects are being awarded on HAM model.

PPP means an arrangement between a government or statutory entity or government owned entity on one side and a private sector entity on the other, for the provision of public assets and/

or related services for public benefit, through investments being made by and/or management undertaken by the private sector entity for a specified time period. There is a substantial risk sharing with the private sector and the private sector receives performance linked payments that conform (or are benchmarked) to specified, pre-determined and measurable performance standards.

A PPP brings the public and private sectors together as partners in a contractual agreement, for a pre-defined period matched to the life of the infrastructure assets used to provide the services. The private partners (investors, contractors and operators) provide specified infrastructure services and, in return, the public sector either pays for those services or grants the private partner the right to generate revenue from the project.

The objectives of a PPP in infrastructure are to

- Increase the availability of infrastructure services.
- To do so with greater efficiency than could be achieved using the traditional public sector approach.

PPPs make this possible because

1) PPPs allow access to the substantial financial resources of the private sector.
2) PPPs enable the public sector to benefit from private sector technical expertise, experience and efficiency.
3) PPPs enable the public sector to transfer project-related risks to the private sector.

3.2.1 *PPP Modes*

The common forms of PPP that are popular in India in Roads and Highways Sector are mentioned below:

3.2.1.1 BOT Toll Model on DBFOT Basis

In this mode, Private developers/ operators, who invest in tollable highway projects, are entitled to collect and retain toll revenues for the tenure of the project concession period. The tolls are prescribed by the Authority on a per vehicle per km basis for different types of vehicles. In this mode, the bidders quote premium/ grant to Authority and the bidder quoting the lowest grant or highest premium is selected as concessionaire. The Concessionaire bears the traffic/tolling risk in these contracts.

3.2.1.2 BOT Annuity Model on DBFOT Basis

In this mode, the bidders quote the annuity payments from the Authority that would cover the cost (construction, operations and maintenance) and an expected return on the investment. The bidder quoting the lowest annuity is awarded the project. The annuities are normally paid

semi-annually by the Authority to the concessionaire and linked to performance covenants. The concessionaire does not bear the traffic/ tolling risk in these contracts. This risk is borne by the Authority.

3.2.1.3 Hybrid Annuity Model on DBFOT Basis

Hybrid Annuity Mode i.e. combination of BOT Annuity Mode and BOT (Toll) mode w.r.t. Grant (40% of Project Cost) portion only as in this model tolling rights will rest with the Authority. In this model, Authority will pay the 40% of Bid Project Cost (BPC) as grant to the Concessionaire during construction period in say 10 (ten) equal instalments, adjusted for the Price Index Multiple, based on the physical progress of the Project.i.e. Payment Milestone for release of payment during Construction Period maybe as under:

Milestone	On achievement of Physical Progress
1st	5%
2nd	10%
3rd	20%
4th	30%
5th	40%
6th	50%
7th	60%
8th	70%
9th	80%
10th	90%

The Completion Cost remaining to be paid shall be due and payable in biannual instalments over the operation period commencing from COD, of say 15 years. The 1st (first) instalment of Annuity Payments shall be due and payable within 15 (fifteen) days of the 180th (one hundred and eightieth) day of COD and the remaining instalments shall be due and payable within 15 (fifteen) days of completion of each of the successive six months.

HYBRID ANNUITY MODE (HAM)

Bid Project Cost (BPC)

40% of BPC during construction period in say 10 instalments based on physical progress of the project

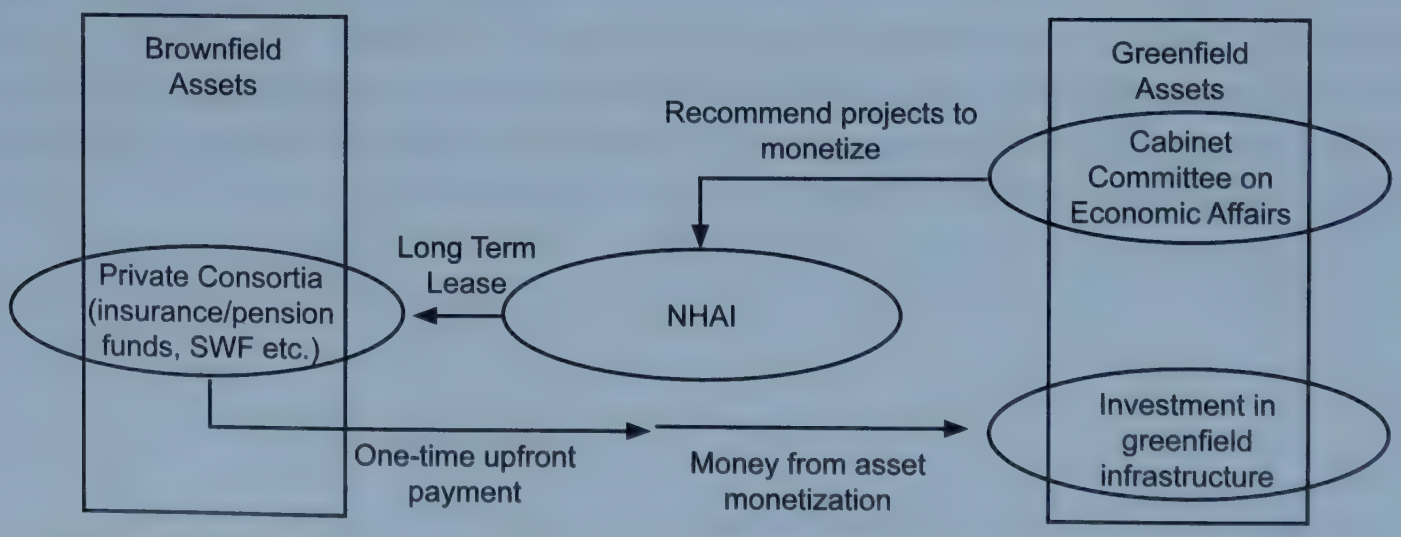
60% of BPC during operation period shall be paid in the form of Bi-Annual Annuity payment along with interest {@ average of one year MCLR of top 5 Scheduled Commercial Banks plus 1.25%} on the outstanding balance.

[1]-The authority shall declare the list of Top 5 Scheduled Commercial Banks on 1st September every calendar year based on the balance sheet size as declared in their annual reports. The 1 year MCLR of the top 5 scheduled commercial banks shall be taken at the start of every quarter

Authority shall also pay the O&M expenses as % of BPC which is specified in the Clause 23.7.1 of CA. The said amount shall be paid to the Concessionaire as bi-annual payment along with the Annuity Amount.

3.2.1.4 Tolling Operation Transfer (TOT) of PPP Projects

In TOT Model, the right of collection and appropriation of Fees for selected operational National Highway (NH) projects constructed through public funding shall be assigned for a pre-determined concession period to concessionaires (developers/investors) against upfront payment of a lump sum amount to Authority. Such assignment of rights shall be based on toll revenue potential of the identified NH projects. Operation & Maintenance (O&M) obligations of such projects shall be with the concessionaire till the completion of concession period. The concessionaires for such projects shall be appointed through a transparent and uniform procurement process within the ambit of a pre-defined and approved implementation framework.



Toll-Operate-Transfer model for infrastructure development in India

3.2.1.5 Critical factors for success of PPP Projects

- One of the critical factors that determine the success of a PPP Project is the selection of a credible project sponsor.
- Appropriate risk balance measures in the concession agreement with the philosophy of risk allocation to the party which is best suited to bear the risk.
- PPP projects are highly capital intensive and require provisions of essential infrastructure services to users on a regular basis during the O & M period.
- A Bidder lacking in sufficient technical and financial capacity can well endanger the project and compromise the quality of services that the government is committed to provide. Due diligence is therefore exercised by the government in laying down qualification criteria for selection of Concessionaire.

CHAPTER 4
RATIO ANALYSIS

4.1 Introduction

The basis for financial analysis, planning and decision making depends on the financial statements which mainly consists of Balance Sheet and Profit and Loss Account. The profit & loss account shows the operating activities of the concern and the balance sheet depicts the balance value of the acquired assets and of liabilities at a particular point of time.

However, the above statements do not disclose all of the necessary and relevant information. For the purpose of obtaining the material and relevant information necessary for ascertaining the financial strengths and weaknesses of an enterprise, it is necessary to analyse the data depicted in the financial statement

4.2 Ratio and Ratio Analysis

Let us first understand the definition of ratio and meaning of ratio analysis:

Definition of Ratio: A ratio is defined as "the indicated quotient of two mathematical expressions and as the relationship between two or more things." Here ratio means financial ratio or accounting ratio which is a mathematical expression of the relationship between accounting figures.

Ratio Analysis: The term financial ratio can be explained by defining how it is calculated and what the objective of this calculation is.

Calculation Basis:

- A relationship expressed in mathematical terms;
- Between two individual figures or group of figures;
- Connected with each other in some logical manner; and
- Selected from financial statements of the concern

Objective for financial ratios: That all stakeholders (owners, investors, lenders, employees etc.) can draw conclusions about the:

- Performance (past, present and future);
- Strengths & weaknesses of a firm; and
- Can take decisions in relation to the firm.

Ratio analysis is based on the fact that a single accounting figure by itself may not communicate any meaningful information but when expressed as a relative to some other figure, it may definitely

provide some significant information. Ratio analysis is not just comparing different numbers from the balance sheet, income statement, and cash flow statement. It is comparing the number against previous years, other companies, the industry, or even the economy in general for the purpose of financial analysis.

Ratio can be classified into various types. Classification from the point of view of financial analysis is as follows:

- Liquidity Ratio
- Activity Ratio
- Solvency Ratio
- Profitability Ratio

1. **Liquidity Ratio:** The terms 'liquidity' and 'short-term solvency' are used synonymously. This ratio helps to understand the liquidity in a business which is the potential ability to meet current obligations. This ratio expresses the relationship between current assets and current liabilites of the business concern during a particular period. The following are the major liquidity ratio:

S. No.	Ratio	Formula	Significant Ratio	Explanation
1.	**Current Ratio** = (Measures of Short term solvency)	**Current Assets** **Current Liability** Current Assets= Inventory+ Debtor+ Cash & Bank+ Receivables/ Accruals+ Loan & Advances+ Any other Current Assets. Current Liability= Creditors+ Short-term Loans+ Bank O/D+ Cash Credit+ O/s Expenses+ Provision for Taxation+ Proposed Dividends+ Any other Current Liability	**2:1** Depends on nature of the business and the characteristics of its current assets and liabilities.	The main question this ratio addresses is: "Does your business have enough current assets to meet the payment schedule of its current debts with a margin of safety for possible losses in current assets"?
2.	**Quick Ratio** = (Measures of liquidity)	**Quick Assets** **Quick/ Current Liability** Quick Assets= Current Assets- Inventory Current Liability= As mentioned under Current Ratio	**1:1**	Quick Assets consist of only cash and near cash assets. It helps answer the question: "If all sales revenues should disappear, could my business meet its current obligations with the readily convertible quick funds on hands"?

3.	**Net Working Capital Ratio =** (Measures of cash flow than a ratio)	**Current Assets - Current Liability (excluding short term bank borrowings)**	Bankers look at Net working Capital over time to determine a company's ability to weather financial cries. Loans are often tied to minimum working capital requirements.

2. **Long term Solvency Ratios/ Leverage Ratios:** The leverage ratio may be defined as those financial ratios which measure the long term stability and structure of the firm. These ratio indicate the mix of funds provided by owners and lenders and assure the lenders of the long term funds with regards to

- Periodic payment of interest during the period of the loan; and
- Repayment of principal amount on maturity.

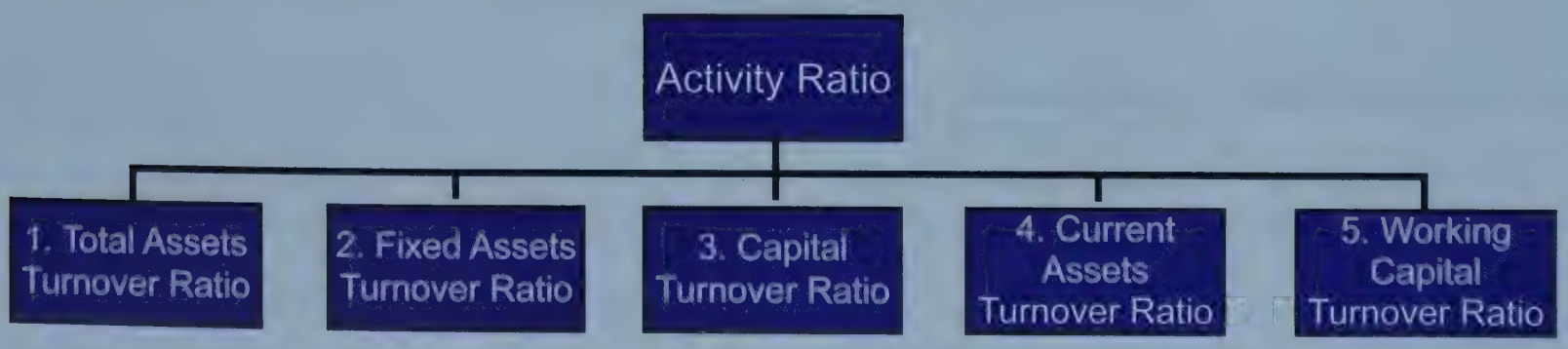
In simple word, measures the long-term obligation of the business concern. This ratio helps to understand, how the long-term funds are used in the business concern.

Leverage Ratios are of two types:

1. Capital Structure Ratio
• Equity Ratio
• Debt Ratio
• Debt to Equity Ratio
• Debt to Total Assets Ratio
• Capital Gearing Ratio
• Proprietary Ratio

2. Coverage Ratio
• Debt - Service Coverage Ratio
• Interest Coverage Ratio
• Preference Dividend Coverage Ratio
• Fixed Change Coverage Ratio

3. **Activity Ratio:** It may be called Efficiency Ratio/ Performance Ratio/ Turnover Ratio. These ratios are employed to evaluate the efficiency with which the firm manages and utilizes its assets. These ratios usually indicate the frequency of Sales w.r.t its assets. This ratio is helpful to understand the performance of the business concern.


Activity Ratio
1. Total Assets Turnover Ratio
2. Fixed Assets Turnover Ratio
3. Capital Turnover Ratio
4. Current Assets Turnover Ratio
5. Working Capital Turnover Ratio

S. No.	Ratio	Formula	Explanation
1.	Total Assets Turnover Ratio	Sales/ Cost of Goods Sold / Total Assets	Measure the efficiency with which the firm/company uses its total asset.
2.	Fixed Assets Turnover Ratio	Sales/ Cost of Goods Sold / Fixed Assets	Measure the efficiency with which the firm/company uses its fixed asset and also indicates efficient utilization of fixed assets in generating sales.

4. **Profitability Ratio:** The profitability ratios measure the profitability or the operational efficiency of the firm. These ratio reflects the final results of business operations. They are some of the most closely watched and widely quoted ratios. Management attempts to maximize these ratios to maximize firm value. The results of the firm can be evaluated in terms of its earnings with reference to a given level of assets or sales or owner's interest etc. The commonly used profitability ratios are given below:

S. No.	Ratio	Formula	Explanation
1.	Profit Margin	Gross Profit / Revenue Net Profit / Revenue	Measures a company's profitability at various cost levels, including gross margin, operating margin, pre-tax margin, and net profit margin.
2.	Return on Assets	Net Profit / Total Assets	Measures how effective a company is in deploying assets to generate sales and eventually profits
3.	Return on Equity	Net Profit / Shareholder's Equity	ROE is a ratio that concerns a company's equity holders the most since it measures their ability to earn a return on their equity investments

CHAPTER 5
TOOLS AND TECHNIQUES OF FINANCIAL ANALYSIS

5.1 Capital Budgeting

Capital Budgeting is one of the most useful techniques in Financial Analysis.Capital budgeting is the process in which a business determines and evaluates potential large expenses or investments. The overall objective of capital budgeting is to maximize the profitability. If a firm concentrates return on investment, this objective can be achieved either by increasing the revenues or reducing the costs. The increasing revenues can be achieved by expansion or the size of operations by adding a new product line.

Capital budgeting is the process of evaluating and selecting long-term investments that are in line with the goal of investor's wealth maximization. When a business makes a capital investment (assets such as equipment, building, land etc.) it incurs a cash outlay in the expectation of future benefits. Out of different investment proposals available to a business, it has to choose a proposal that provides the best return and the return equals to, or greater than, that required by the investors.

In simple terms, Capital Budgeting involves

- Evaluating investment project proposals that are strategic to business overall objectives;
- Estimating and evaluating post-tax incremental cash flows for each of the investment proposals; and
- Selecting an investment proposal that maximizes the return to the investors.

However, Capital Budgeting excludes certain investment decisions, wherein, the benefits of investment proposals cannot be directly quantified. For example, management may be considering a proposal to build a recreation room for employees. The decision in this case will be based on qualitative factors, such as management − employee relations, with less consideration on direct financial returns.

However, most investment proposals considered by management will require quantitative estimates of the benefits to be derived from accepting the project. A bad decision can be detrimental to the value of the organization over a long period of time.

5.1.1 *Purpose of Capital Budgeting*

The capital budgeting decisions are important, crucial and critical business decisions due to following reasons:

- **Substantial expenditure:** Capital budgeting decisions involve the investment of substantial amount of funds. It is therefore necessary for a firm to make such decisions after due diligence

so as to result in the profitable use of its scarce resources.The hasty and incorrect decisions would not only result into huge losses but may also account for the failure of the firm.

- **Long time period:** The capital budgeting decision has its effect over a long period of time. These decisions not only affect the future benefits and costs of the firm but also influence the rate and direction of growth of the firm.

- **Irreversibility:** Most of the investment decisions are irreversible. Once they are taken, the firm may not be in a position to reverse them back. This is because it is difficult to find a buyer for the second-hand capital items.

- **Complex decision:** The capital investment decision involves an assessment of future events, which in fact is difficult to predict. Further it is quite difficult to estimate in quantitative terms all the benefits or the costs relating to a particular investment decision.

5.2 Projecting Cash flows

Capital Budgeting analysis considers only incremental cash flows from an investment likely to result due to acceptance of any project. Therefore, one of the most important tasks in capital budgeting is estimating future cash flows for a project. Since timing of cash outflows may not match with the period of profit normally firms may be more interested in cash flows. For example Profit and Loss Account may show a sale of Rs.100 crore, but actual cash receipt may be lesser. Similarly, for purchase full payment may not have been made by the company. Further, depreciation is a non-cash item as its outflow of cash takes place in the beginning at the time of purchase of machinery and at the end as scrap sale. Thus, due to this time difference, it is better to eliminate decision on the basis of cash flows rather than profit.

The final decision we make at the end of the capital budgeting process is no better than the accuracy of our cash flow estimates. The estimation of costs and benefits are made with the help of inputs provided by marketing, production, engineering, costing, purchase, taxation, and other departments.

The project cash flow stream consists of cash outflows and cash inflows. The costs are denoted as cash outflows whereas the benefits are denoted as cash inflows. An investment decision implies the choice of an objective, an appraisal technique and the project's life. The objective and technique must be related to definite period of time. The life of the project may be determined by taking into consideration the following factors:

i) Technological obsolescence;

ii) Physical deterioration; and

iii) A decline in demand for the output of the project.

No matter how good a company's maintenance policy, its technological forecasting ability or its demand forecasting ability, uncertainty will always be present because of the difficulty in predicting the duration of a project life.

5.2.1 *Calculating Cash Flows*

Before, analyzing how cash flow is computed in capital budgeting decision following items need consideration:

a) **Depreciation:** As mentioned earlier depreciation is a non-cash item and itself does not affect the cash flow. However, we must consider tax shield or benefit from depreciation in our analysis. Since this benefit reduces cash outflow for taxes it is considered as cash inflow.

b) **Opportunity Cost:** Sometimes, managers of a project may overlook some of the cost of the project which are not paid in cash directly i.e. opportunity cost.

This opportunity cost can occur both at the time of initial outlay or during the tenure of the project. For example if a company owns a piece of land acquired 10 years ago for Rs.1 crore at that time and today it can be sold for Rs.10 crore. If company uses this piece of land for a project then its sale value i.e. Rs.10 crore forms the part of initial outlay. The cost of acquisition 10 years ago shall be irrelevant for decision making.

Similarly, alternative cash inflow foregone due to acceptance of any project should be considered as opportunity cost and should be included in our analysis.

c) **Sunk Cost:** Another potential problem relates to sunk cost. Sunk cost is an outlay that has already been incurred and hence should be excluded from capital budgeting analysis. For example, if a company has paid a sum of Rs.1,00,000 for consultancy charges to a firm for the preparation of a Project Report for analysis to decide whether to take a particular project or not is irrelevant for analysis as sum has already been paid and shall not affect our decision whether project should be undertaken or not.

d) **Working Capital:** Every big project requires working capital because for every business investment in working capital is must. Therefore, while evaluating the projects initial working capital requirement should be treated as cash outflow and at the end of the project its release should be treated as cash inflow. It is important to note that no depreciation is provided on working capital though it might be possible that at the time of its release its value might have been reduced. Further there may be also a possibility that additional working capital may be required during the life of the project. In such cases the additional working capital required is treated as cash outflow at that period of time. Similarly, any reduction in working capital shall be treated as cash inflow. It may be noted that if noting has been specifically mentioned for the release of working capital it is assumed that full amount has been realized at the end of the project. However, adjustment on account of increase or decrease in working capital needs to be incorporated.

e) **Allocated Overheads:** As discussed in subject of Cost Accounting allocated overheads are charged on the basis of some rational basis such as machine hour, labour hour, direct material consumption etc. Since, expenditures already incurred are allocated to

new proposal; they should not be considered as cash flows. However, it is expected that overhead cost shall be increased due to acceptance of any proposal then incremental overhead cost shall be treated as cash outflow.

f) **Additional Capital Investment:** It is not necessary that capital investment shall be required in the beginning of the project. It can also be required during the continuance of the project. In such cases it shall be treated as cash outflows.

5.2.2 *Categories of Cash Flows*

It is helpful to place project cash flows into three categories:-

a) **Initial Cash Outflow:** The initial cash out flow for a project depends upon the type of capital investment decision as follows:

i) If decision is related to investment in a fresh proposal or an expansion decision then initial cash outflow shall be calculated as follows:

Cost of New Asset(s)

+ Installation/Set-Up Costs

+ Investment in Working Capital

= Initial Cash Outflow

ii) If decision is related to replacement decision then initial cash outflow shall be calculated as follows:

Cost of New Asset(s)

+ Installation/Set-Up Costs

+ (-) Increase (Decrease) in Net Working Capital Level

- Net Proceeds from sale of Old Asset (If it is a replacement situation)

+(-) Taxes (tax saving/ loss) due to sale of Old Asset (If it is a replacement situation)

= Initial Cash Outflow

b) **Interim Cash Flows:** After making the initial cash outflow that is necessary to begin implementing a project, the firm hopes to get benefit from the future cash inflows generated by the project. As mentioned earlier calculation of cash flows depends on the fact whether analysis is related to fresh project or modernization of existing facilities or replacement of existing machined decision.

i) **New Project: If analysis is related to a fresh or completely a new project then interim cash flow is calculated as follows:-**

Profit after Tax (PAT)

(+) Non-Cash Expenses (e.g. Depreciation)

- (+) Net increase (decrease) in Working Capital

= Interim net cash flow for the period

ii) **Similarly, interim cash flow in case of replacement decision shall be calculated as follows:**

Net increase (decrease) in Operating Revenue

- (+) Net increase (decrease) in Operating Expenses

= Net change in income before taxes

- (+) Net increase (decrease) in taxes

= Net change in income after taxes

+(-) Net increase (decrease) in depreciation charges

= Incremental net cash flow for the period

c) **Terminal-Year Incremental Net Cash Flow:** For the purpose of Terminal Year we will first calculate the incremental net cash flow for the period as calculated in point (b) above and further to it we will make adjustments in order to arrive at Terminal-Year Incremental Net Cash flow as follows:-

Final salvage value (disposal costs) of asset

(+) Interim Cash Flow

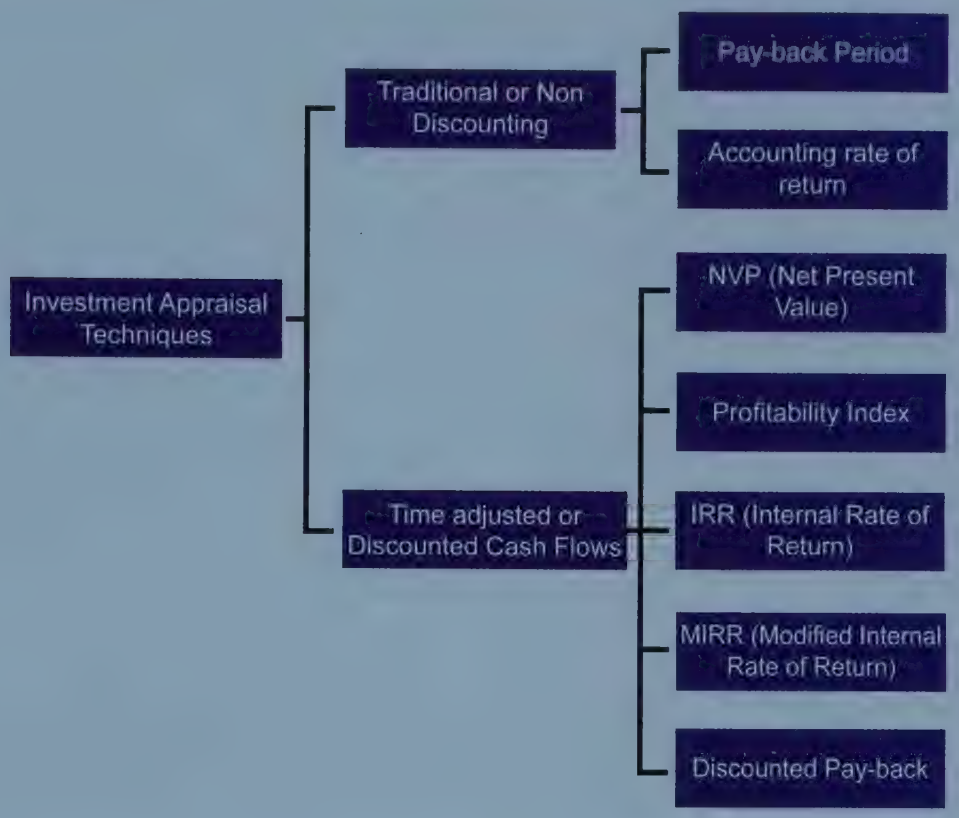
- (+) Taxes (tax saving) due to sale or disposal of asset (Including Depreciation)

(+) Release of Net Working Capital

= Terminal Year incremental net cash flow

5.3 Investment Appraisal Techniques

There are a number of techniques available for appraisal of investment proposals and can be classified as presented below:



Organization may use any or more of capital investment evaluation techniques; some organizations use different methods for different types of projects while others may use multiple methods for evaluating each project. These techniques have been discussed below

5.3.1 *Payback Period* (Table 5.1)

The payback period of an investment is the length of time required for the cumulative total net cash flows from the investment to equal the total initial cash outlays. At that point in time, the investor has recovered the money invested in the project.

Steps:-

a) The first step in calculating the payback period is determining the total initial capital investment and

b) The second step is calculating/estimating the annual expected after-tax net cash flows over the useful life of the investment.

1. Formula: When the net cash flows are uniform over the useful life of the project, the number of years in the payback period can be calculated using the following equation:

$$\text{Payback period} = \frac{\textit{Total initial capital investment}}{\textit{Annual expected after tax net in flow}}$$

Box 5.1 Illustration for payback period

Suppose a project costs INR 20,00,000 and yields annually a profit of INR 3,00,000 after depreciation @ 12½% (straight line method) and the tax rate is 50%. The first step would be to calculate the cash inflow from this project. The cash inflow is INR 4,00,000 calculated as follows:

Profit before tax	3,00,000
Less :Tax @ 50%	1,50,000
Profit after tax	1,50,000
Add :Depreciation written off	2,50,000
Total cash inflow	4,00,000

While calculating cash inflow, depreciation is added back to profit after tax since it does not result in cash outflow. The cash generated from a project therefore is equal to profit after tax plus depreciation.

The payback period of the project shall be:

$$\text{Payback period} = \frac{20,00,000}{4,00,000} = 5 \text{ years}$$

Some Accountants calculate payback period after discounting the cash flows by a predetermined rate and the payback period so calculated is called, 'Discounted payback period' (discussed later on).

2. When the annual net cash flows are not uniform, the cumulative cash inflow from operations must be calculated for each year. The payback period shall be corresponding period when total of cumulative cash inflows is equal to the initial capital investment. However, if exact sum does not match then the period in which it lies should be identified. After that we need to compute the fraction of the year that is needed to complete the total payback. This method can be understood with the help of an example.

5.3.2 *Payback Reciprocal*

As the name indicates it is the reciprocal of payback period. A major drawback of the payback period method of capital budgeting is that it does not indicate any cut off period for the purpose of investment decision. It is, however, argued that the reciprocal of the payback would be a close approximation of the Internal Rate of Return (later discussed in detail) if the life of the project is at least twice the payback period and the project generates equal amount of the annual cash inflows. In practice, the payback reciprocal is a helpful tool for quickly estimating the rate of return of a project provided its life is at least twice the payback period.

The payback reciprocal can be calculated as follows:

$$\text{Payback period} = \frac{\text{Average annual cash in flow}}{\text{Initial investment}}$$

Box 5.2: Illustration for Payback Period - Non uniform Cash flows

Suppose XYZ Ltd. is analysing a project requiring an initial cash outlay of INR 2,00,000 and expected to generate cash inflows as follows:

Year	Annual Cash Inflows
1.	80,000
2.	60,000
3.	60,000
4.	20,000

Its payback period shall be computed by using cumulative cash flows as follows:

Year	Annual Cash Inflows	Cumulative Cash Inflows
1.	80,000	80,000
2.	60,000	1,60,000
3.	60,000	2,00,000
4.	20,000	2,20,000

From the above table, the payback period is 3 years

Now, suppose, if in above case had the initial outlay been INR 2,05,000 then payback period shall be computed as follows:

Year	Annual Cash Inflows	Cumulative Cash Inflows
1.	80,000	80,000
2.	60,000	1,60,000
3.	60,000	2,00,000
4.	20,000	2,20,000

From above table it is clear that payback period shall lie between 3 to 4 years. Since upto 3 years a sum of INR 2,00,000 shall be recovered balance of INR 5,000 shall be recovered in the part (fraction) of 4^{th} year computed as follows:

$$\frac{5000}{20000} = \frac{1}{4} \text{ years}$$

Thus, total cash outlay of INR 2,05,000 shall be recovered in 3¼ years' time.

Table 5.1: Advantages and limitations of payback period

Advantages of Payback Period	Limitations of Payback Period
It is easy to compute.	It ignores the time value of money. As long as the payback periods for two projects are the same, the payback period technique considers them equal as investments, even if one project generates most of its net cash inflows in the early years of the project while the other project generates most of its net cash inflows in the latter years of the payback period.
It is easy to understand as it provides a quick estimate of the time needed for the organization to recoup the cash invested.	A second limitation of this technique is its failure to consider an investment's total profitability; it only considers cash flows from the initiation of the project until its payback period and ignores cash flows after the payback period.
The length of the payback period can also serve as an estimate of a project's risk; the longer the payback period, the riskier the project as long-term predictions are less reliable. In some industries with high obsolescence risk like software industry or in situations where an organization is short on cash, short payback periods often become the determining factor for investments.	Use of the payback period technique may cause organizations to place too much emphasis on short payback periods thereby ignoring the need to invest in long-term projects that would enhance its competitive position.

Box 5.3 Illustration for payback reciprocal

Suppose a project requires an initial investment of INR 20,000 and it would give annual cash inflow of INR 4,000. The useful life of the project is estimated to be 5 years.

In this example payback reciprocal will be:

$$\text{Payback reciprocal} = \frac{4000}{20000} = 20\%$$

5.3.3 *Accounting (Book) Rate of Return (ARR)*

The accounting rate of return of an investment measures the average annual net income of the project (incremental income) as a percentage of the investment.

$$\text{Accounting rate of return} = \frac{\text{Average annual net income}}{\text{investment}}$$

The numerator is the average annual net income generated by the project over its useful life. The denominator can be either the initial investment (including installation cost) or the average investment over the useful life of the project. Average investment means the average amount of fund remained blocked during the lifetime of the project under consideration. Further ARR can be calculated in a number of ways as shown in the following example.

Box 5.4 Illustration for Accounting Rate of Return (ARR)

Suppose Times Ltd. is going to invest in a project a sum of INR 3,00,000 having a life span of 3 years. Salvage value of machine is INR 90,000. The profit before depreciation for each year is INR 1,50,000.The Profit after Tax and value of Investment in the Beginning and at the End of the each year shall be as follows:

Year	PBT (INR)	Depreciation (INR)	Profit after Dep. (INR)	Value of Investment in (INR)	
				Beginning	End
1	1,50,000	70,000	80,000	3,00,000	2,30,000
2	1,50,000	70,000	80,000	2,30,000	1,60,000
3	1,50,000	70,000	80,000	1,60,000	90,000

The ARR can be computed by following methods as follows:

(a) Version 1: Annual Basis

$$\text{ARR} = \frac{\text{Profit after Depreciation}}{\text{Investment in the beginning of the year}}$$

Year	ARR
1	80,000 / 3,00,000 = 26.67%
2	80,000 / 2,30,000 = 34.78%
3	80,000 / 1,60,000 = 50%
Average ARR	37.15%

(b) Version 2: Total Investment Basis

$$ARR = \frac{\text{Average Annual Profit}}{\text{Investment in the beginning}}$$

$$ARR = \frac{(8000 + 80000 + 80000)/3}{3,00,000} = 26.67\%$$

(c) Version 3: Average Investment Basis

$$ARR = \frac{\text{Average Annual Profit}}{\text{Average Investment}}$$

Average Investment = (3,00,000 + 90,000)/2 = 1,95,000
or ½ (Initial Investment – Salvage Value) + Salvage Value
= ½ (₹ 3,00,000 – ₹ 90,000) + ₹ 90,000 = ` 1,95,000

$$ARR = \frac{80000}{1,95,000} = 41.03\%$$

Some organizations prefer the initial investment because it is objectively determined and is not influenced by either the choice of the depreciation method or the estimation of the salvage value. Either of these amounts is used in practice but it is important that the same method be used for all investments under consideration.

S. No.	Advantages of ARR	Limitations of ARR
1.	This technique uses readily available data that is routinely generated for financial reports and does not require any special procedures to generate data.	The accounting rate of return technique, like the payback period technique, ignores the time value of money and considers the value of all cash flows to be equal.
2.	This method may also mirror the method used to evaluate performance on the operating results of an investment and management performance. Using the same procedure in both decision-making and performance evaluation ensures consistency.	The technique uses accounting numbers that are dependent on the organization's choice of accounting procedures, and different accounting procedures, e.g., depreciation methods, can lead to substantially different amounts for an investment's net income and book values.

3.	Lastly, the calculation of the accounting rate of return method considers all net incomes over the entire life of the project and provides a measure of the investment's profitability.	The method uses net income rather than cash flows; while net income is a useful measure of profitability, the net cash flow is a better measure of an investment's performance. Furthermore, inclusion of only the book value of the invested asset ignores the fact that a project can require commitments of working capital and other outlays that are not included in the book value of the project.

5.3.4 *Net Present Value Technique (NPV)*

The net present value technique is a discounted cash flow method that considers the time value of money in evaluating capital investments. An investment has cash flows throughout its life, and it is assumed that a rupee of cash flow in the early years of an investment is worth more than a rupee of cash flow in a later year. The net present value method uses a specified discount rate to bring all subsequent net cash inflows after the initial investment to their present values (the time of the initial investment is year 0).

5.3.4.1 Determining Discount Rate

Theoretically, the discount rate or desired rate of return on an investment is the rate of return of the firm would have earned by investing the same funds in the best available alternative investment that has the same risk. Determining the best alternative opportunity available is difficult in practical terms so rather than using the true opportunity cost, organizations often use an alternative measure for the desired rate of return. An organization may establish a minimum rate of return that all capital projects must meet; this minimum could be based on an industry average or the cost of other investment opportunities. Many organizations choose to use the overall cost of capital or Weighted Average Cost of Capital (WACC) that an organization has incurred in raising funds or expects to incur in raising the funds needed for an investment.

5.3.4.2 Calculation of NPV

The net present value of a project is the amount, in current value of rupees, the investment earns after paying cost of capital in each period.

Net present value = Present value of cash inflow - Present value of cash outflow

The steps for calculating net present value are:

1) Determine the cash outflow and cash inflow in each year of the investment
2) Select the desired rate of return or discounting rate or Weighted Average Cost of Capital.
3) Find the discount factor for each year based on the desired rate of return selected.
4) Determine the present values of the net cash flows by multiplying the cash flows by respective the discount factors of respective period called Present Value (PV) of Cash flows
5) Total the amounts of all PVs of Cash Flows

Decision Rule for Evaluating a proposal:

- If NPV ≥ 0 Accept the Proposal
- If NPV ≤ 0 Reject the Proposal

Compute the net present value for a project with a net investment of INR 1, 00,000 and net cash flows year one is INR 55,000; for year two is INR 80,000 and for year three is INR 15,000. Further, the company's cost of capital is 10%?

[PVIF @ 10% for three years are 0.909, 0.826 and 0.751]

Solution:

Year	Net Cash Flows	PVIF @ 10%	Discounted Cash Flows
0	(1,00,000)	1.000	(1,00,000)
1	55,000	0.909	49,995
2	80,000	0.826	66,080
3	15,000	0.751	11,265
Net Present Value			27,340

Recommendation: Since the net present value of the project is positive, the company can accept the project

S. No.	Advantages of NPV	Limitations of NPV
1.	NPV method takes into account the time value of money.	It involves difficult calculations.
2.	The whole stream of cash outflows and cash inflows is considered.	The application of this method necessitates forecasting cash flows and the discount rate. Thus accuracy of NPV depends on accurate estimation of these two factors which may be quite difficult in practice.

		The decision under NPV method is based on absolute measure. It ignores the difference in initial outflows, size of different proposals etc. while evaluating mutually exclusive projects.
3.	The net present value can be seen as the addition to the wealth of shareholders. The criterion of NPV is thus in conformity with basic financial objectives.	
4.	The NPV uses the discounted cash flows i.e., expresses cash flows in terms of current rupees. The NPVs of different projects therefore can be compared. It implies that each project can be evaluated independent of others on its own merit.	

5.3.5 *Internal Rate of Return Method (IRR)*

The internal rate of return method considers the time value of money, the initial cash investment, and all cash flows from the investment. But unlike the net present value method, the internal rate of return method does not use the desired rate of return but estimates the discount rate that makes the present value of subsequent net cash inflows equal to the present value of all cash outflows including the initial investment. This discount rate is called IRR.

IRR Definition: Internal rate of return for an investment proposal is the discount rate that equates the present value of the expected net cash inflows with the present value of all cash outflows including the initial cash outflow. This IRR is then compared to a criterion rate of return that can be the organization's desired rate of return for evaluating capital investments.

Calculating IRR: The procedures for computing the internal rate of return vary with the pattern of cash inflow minus the cash outflows over the useful life of an investment.

What Does Internal Rate of Return - IRR Mean?

The discount rate often used in capital budgeting that makes the net present value of all cash flows from a particular project equal to zero. Generally speaking, the higher a project's internal rate of return, the more desirable it is to undertake the project.

In other words, ***IRR is the rate of return at which the NPV of the project is equal to Zero*** i.e Present value of cash outflow = Present value of Future Cash Inflows.

There are two types of IRR:

- **PROJECT IRR:** The project IRR takes as its inflows the full amount(s) of money that are needed in the project. The outflows are the cash generated by the project. The IRR is the internal rate of return of these cash flows. The calculation assumes that no debt is used for the project.

- **EQUITY IRR:** Equity IRR assumes that you use debt for the project, so the inflows are the cash flows required minus any debt that was raised for the project. The outflows are cash flows from the project minus any interest and debt repayments. Hence, equity IRR is essentially the "leveraged" version of project IRR.

Example for better understanding of concept of IRR:

Suppose you are starting a project with a mix of debt and equity. Now, you have two scenarios, where your Project IRR is lower than the interest rates and another one where your project IRR is higher.

In scenario 1: Rate of interest payment on debt is higher

- It would not be feasible to take-up the project, because of higher interest rates that you would pay on debt, which means reducing yours'/equity holders' profit by paying a part of it to the debt holders as Interest. However, if this is the scenario, your Project IRR would be higher than the Equity IRR.

In scenario 2: Rate of interest payment on debt is lower

- This is the most likely cases in all the projects that you would start, your interest rate will be lower than the project IRR, which means there would be a bigger shares available for Equity holders, as they would be able to lever their position using debt and generate extra cash.
- Three possible cases

Case-1: No Debt in the capital structure:

- Always, Project IRR = Equity IRR

Case-2: Debt equity Ratio = 1:1

Suppose project cost is Rs.100 Crore (Rs. 50 Crore of Equity and Rs.50 Crore of Debt), interest rate is 10%, and project IRR is 20%. In this case, while you would generate 20% return on your equity, ie., 50*20% = Rs. 10 Crore and you would also generate Rs. 10 Crore on the balance investment (Debt investment) as well (20% project IRR; total return Rs. 100 Crore*20% = Rs.20 Crore).However, you would pay only Rs.5 Crore as interest payment (10% interest rate).

- In total, you will have extra Rs.5 Crore with you because of the leverage that you have used in the project, and the total equity return will go up to 30%.

Case-3: 100% Debt:

- While its an unlikely situation, in scenario 2, you will be able to capture profit, without using your own money, and just by making sure that your Project IRR is higher than the applicable interest rate. However, this is a very unlikely situation, where you start a project without any equity ownership.

Note: *Case 3 is not normally permitted by the Government on Road Infrastructure PPP Projects.*

Difference for a potential investor can be looked from two perspectives - Debt holder and Equity holder.

A potential investor in debt would like to minimize the risk and would not seek higher project IRR, as higher project IRR would bring higher risk too, and being a debt-holder, the investor is not being paid for that extra risk. From equity investors point of view, higher the risk higher the gain.

CHAPTER 6

INPUTS & ASSUMPTIONS TO CARRY OUT THE FINANCIAL ANALYSIS

Various Inputs and Assumptions are required to carry out the financial analysis under different options. In this chapter we will discuss the various inputs and assumptions required for carrying out the financial analysis under different modes of delivery of road projects:

a) BOT (Toll) Mode

b) BOT (Annuity) Mode

c) Hybrid Annuity Mode (HAM)

6.1 BOT (Toll) Mode

6.1.1 *Inputs required for carrying out the financial modelling:*

S. No.	Particulars	Source of Information	
A)	Total ConstructionCost (in Rs. Crore)	*	
B)	Base year in which Construction Cost was assessed (in Financial Year)	*	
C)	Concession period proposed in number of years.	May be calculated based on the Design Capacity of the Proposed Highway and total PCUs.	
D)	Construction period (in number of years/ ½ years)	*	
E)	Construction scheduling during the construction period (in %, in financial years/ financial half years)	*	
F)	Total length of highway stretch in km	*	
G)	Flexible pavement out of total length	*	
H)	Rigid pavement out of total length	*	
I)	Number of Toll Plazas	*	
J)	Toll Plazas	TP-1	TP-2
K)	Whether the Stretch is already under Toll Operation	*	*
L)	Length of highway stretch in km catering to the relevant toll plaza	*	*

S. No.	Particulars	Source of Information	
M)	Total Tollable traffic (in PCU's)	*	*
N)	Total traffic liable to pay toll AADT	*	*
1)	Car/ Jeep/Van/LMV	*	*
2)	LCV/ Light commercial vehicle	*	*
3)	Mini Bus	*	*
4)	Bus	*	*
5)	Truck of 2 Axles	*	*
6)	Truck of 3 Axles	*	*
7)	HCM/ EME/ MAV (Multi Axle vehicles 4-6 axles)	*	*
8)	Oversized vehicles (6+ axle vehicles)	*	*
O)	Traffic survey year(in financial year/ Month)	*	
P)	Actual District Locally registered Vehicles (in AADT):	**TP-1**	**TP-2**
1)	LCV/ Light commercial vehicle	*	*
2)	Mini Bus	*	*
3)	Bus	*	*
4)	Truck of 2 Axles	*	*
5)	Truck of 3 Axles	*	*
6)	HCM/ EME/ MAV (Multi Axle vehicles 4-6 axles)	*	*
7)	Oversized vehicles (6+ axle vehicles)	*	*
Q)	Traffic survey year(in financial year/ Month)	*	
R)	**Major Structures having length exceeding 60 meters**		
1)	**Structure-1** a- Construction cost (in Rs. Cr) b- Base year assessing the said cost c- Length of structure in m d- Toll plaza e- Chainage	*	
2)	**Structure-2** a- Construction cost (in Rs. Cr) b- Base year assessing the said cost c- Length of structure in m d- Toll plaza e- Chainage	*	

S. No.	Particulars	Source of Information
S)	**Bypass**	
1)	**Bypass-1** a- Construction cost (in Rs. Cr) b- Base year assessing the said cost c- Length of Bypass in km d- Toll plaza e- Chainage	*
2)	**Bypass-2** a- Construction cost (in Rs. Cr) b- Base year assessing the said cost c- Length of Bypass in km d- Toll plaza e- Chainage	*
T)	**Whether Aforesaid Bypass having any major structures having length exceeding 60 meters? If Yes, Provide the details**	
1)	**Structure-1** a- Construction cost (in Rs. Cr) b- Base year assessing the said cost c- Length of structure in m d- Toll plaza e- Chainage	*
U)	**Construction Start Date**	Based on the date of project preparation and time lines as specified in the Model RFP documents

6.1.1.1 Total Traffic (AADT)

Traffic Figures (AADT)*	TP-1	TP-2
Two wheeler	*	*
Three Wheeler/ Auto Rickshaw	*	*
Car/ Jeep/Van/LMV	*	*
LCV/ Light commercial vehicle	*	*
Mini Bus	*	*
Bus	*	*
Truck of 2 Axles	*	*
Truck of 3 Axles	*	*
HCM/ EME/ MAV (Multi Axle vehicles 4-6 axles)	*	*
Oversized vehicles (7+ axle vehicles)	*	*

Tractor with Trailer	*	*
Tractor without Trailer	*	*
Ambulance, Fire Tender	*	*
Cycle	*	*
Cycle Rickshaw	*	*
Bullock Cart	*	*
Other (Please specify the description) - Non Motorsied	*	*
Other – Toll exempted	*	*
Total AADT	*	*
Total PCUs	*	*

** As assessed by the Technical Consultant in the Cost Estimate/DPR and approved by the Authority*

6.1.2 *Assumptions that may be followed for carrying out the financial modelling*

Sl. No.	Item	Assumptions proposed for BOT Toll Mode
1)	Construction Cost	As per Cost Estimate prepared by Technical Consultant and approved by the Authority which is escalated by 5% per FY upto the start of construction.
2)	Contingencies	1% of Construction Cost
3)	IC/ preoperative expenses	1% of EPC Cost EPC Cost to be sum of Construction Cost and Contingencies
4)	Financing cost	Cost upto Rs.500 Crore: 2% of Debt Cost (Rs.500 Cr to Rs. 1000 Cr): 1.5% of debt Cost > Rs.1000 Crore: 1% of Debt
5)	Rate of Interest	• SBI 3 years MCLR+ 2.50% for BOT (Toll) • SBI 3 Years MCLR + 2% for BOT (Annuity).
6)	Debt Equity Ratio	70 : 30
7)	Equity Drawdown	• In case of VGF: 100% upfront equity. • In case of no VGF: 25% upfront equity contribution and balance in proportion to debt.
8)	Debt drawdown	After spending the upfront equity
9)	Periodic Maintenance	For Flexible Pavement: • Say Rs.35 lacs/km/6 year • Say For Two laning 60% and for six lane 150% of the cost is considered Nil for Rigid pavement

Sl. No.	Item	Assumptions proposed for BOT Toll Mode
10)	Routine Maintenance	• Say Rs. 3.50 lacs/km/Year for Flexible pavement • Say Rs. 4.00 lacs/km/year for Rigid Pavement • (Say For Two laning 60% and for six lane 150% of the cost is considered) (In year of periodic maintenance, Routine maintenance is not considered)
11)	Other office expenses	• Say Rs.2.50 cr/ year . • (Say For Two laning 60% and for six lane 150% of the cost is considered)
12)	Electricity & Patrolling expenses	• Say Rs.1.25 lacs/km/year . • (Say For Two laning 60% and for six lane 150% of the cost is considered)
13)	Insurance	0.15% of TPC/year
14)	Inflation on above expenditure (except insurance)	5% per year
15)	District Registered Vehicles	It should be worked out based on actual survey
16)	Discount rate for NPV	Say 12%.
17)	Income Tax Rate	As per rates prevailing at the time of preparation of financial analysis.
18)	MAT Rate	As per rates prevailing at the time of preparation of financial analysis.
19)	Traffic Leakage	Car/ Jeep/ Van @ say 10% and other vehicles @ say 5%
20)	Exempted Vehicles	Car/ Jeep/ Van @ say 3% and other vehicles @ say Nil.
21)	Door to Door Loan Tenure	13 years
22)	Moratorium period for Loan Repayment	Construction Period plus 6 Months
23)	Loan repayment period	Loan Tenor minus Moratorium period, to be paid quarterly in equal instalment
24)	Depreciation period	Concession period minus Construction Period

Sl. No.	Item	Assumptions proposed for BOT Toll Mode
25)	Treatment of expenditure on development of highway	Treatment of expenditure incurred on development of highway in BOT mode under Income Tax Act, 1961: As per Section 35AD.
26)	SLM Depreciation	Equally divided in whole depreciation period keeping 5% as Salvage Value as per Companies Act, 2013.

6.1.3 *Tolling Strategy*

For Toll rates, as an illustration, notification of the National Highways fee (Determination of Rates and Collection) Rules, 2008 has been used along with the following amendments to the said toll policy issued in the past:

1) Amendment to Toll rates notification of the National Highways fee (Determination of Rates and Collection) Rules, 2008 called as National Highways fee (Determination of Rates and Collection) Amendment Rules, 2010 printed in Gazette of India dated 3rd December 2010.

2) Amendment to Toll rates notification of the National Highways fee (Determination of Rates and Collection) Rules, 2008 called as National Highways fee (Determination of Rates and Collection) Amendment Rules, 2011 printed in Gazette of India dated 12th January 2011

3) Amendment to Toll rates notification of the National Highways fee (Determination of Rates and Collection) Rules, 2008 called as National Highways fee (Determination of Rates and Collection) Second Amendment Rules, 2011 printed in Gazette of India dated 12th October 2011

4) Amendment to Toll rates notification of the National Highways fee (Determination of Rates and Collection) Rules, 2008 called as National Highways fee (Determination of Rates and Collection) Amendment Rules, 2013 printed in Gazette of India dated 16th December 2013

5) Amendment to Toll rates notification of the National Highways fee (Determination of Rates and Collection) Rules, 2008 called as National Highways fee (Determination of Rates and Collection) Amendment Rules, 2014 printed in Gazette of India dated 16th January 2014

6) Amendment to Toll rates notification of the National Highways fee (Determination of Rates and Collection) Rules, 2008 called as National Highways fee (Determination of Rates and Collection) Second Amendment Rules, 2014 printed in Gazette of India dated 21st November 2014

7) Amendment to Toll rates notification of the National Highways fee (Determination of Rates and Collection) Rules, 2008 called as National Highways Fee (Determination of Rates and Collection) Amendment Rules, 2015 issued vide Notification No G.S.R. 220 (E) dated 23.03.2015.

For State Government Projects, the extant toll policy of the state shall apply.

Based on the aforesaid Inputs and Assumptions, an analysis is to be carried out in order to assess the expected grant [also known as Viability Gap Funding (VGF)] or expected Premium at a fixed benchmark which is 15% Equity IRR[1] (or as decided by the Authority).

6.1.4 *BOT Toll Financial Analysis*

In this mode of delivery, traffic/toll risk is borne by the Concessionaire Project which have high numbers of tollable traffic are viable and in such project, the analysis worked out the premium expected by the Authority from the Concessionaire under the competitive bidding. Similarly, the project which has less traffic or project which will not get premium are viable on some amount of grant/subsidy/VGF which will be required from the Authority in order to make the project viable.

It needs to be recognized that in case of any changes in the assumptions/project parameters used for developing the financial analysis, the project financial parameters are likely to undergo a change that might significantly impact the potential (adversely/ favorably) of developing the project on BOT (Toll) mode.

6.2 BOT (Annuity) Mode

The inputs and assumptions required under this model are similar to the inputs and assumptions required under the BOT (Toll) mode except the traffic, bypass, structure and toll rates as under this model, the tolling is not the responsibility of the Concessionaire i.e. there is no traffic risk with the Concessionaire.

Further, unlike BOT (Toll) mode, the output under this model is expected semi-annual annuity at 15% Equity IRR instead of expected premium/grant.

It needs to be recognized that in case of any changes in the assumptions/project parameters used for developing the financial analysis, the project financial parameters are likely to undergo a change that might significantly impact the potential (adversely / favorably) of developing the project on BOT (Annuity) mode.

6.3 TOT Mode

The inputs and assumptions required under this model are similar to the inputs and assumptions required under the BOT (Toll) mode, except initial Construction Cost, pre-operative expenses, financing cost & interest during construction however upfront payment lump-sum to Authority for a pre-determined concession period is considered instead of premium/ additional premium fee being considered in BOT (Toll). Further, revenue from tolling need to appropriate towards operation & maintenance (routine & major maintenance, tolling expenses, office expenses, insurance) similar like BOT (Toll) is considered during the concession period. Any Capacity

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[1] 15% Equity IRR is the benchmark to assess the viability of the highway project on BOT mode, as per NHAI/ MORTH circulars.

Augmentation in the project highway is the responsibility of Authority, therefore, no capital expenditure is considered for capacity augmentation during the concession period. Further, like BOT (Toll) mode, the output under this model is expected at 15% Equity IRR instead of expected premium/grant. The cash accruals so generated needs to be discounted @ Bank Rate + 3.00% to access the upfront payment towards concession period.

6.4 Hybrid Annuity Mode (HAM)

6.4.1 *Inputs required for carrying out the financial modelling*

S. No.	Particulars	Source of Information
A)	Total Construction Cost (in Rs. Crores)	*
B)	Base year in which Construction Cost was assessed (in Financial Year)	*
C)	Concession period proposed in number of years.	Construction Period plus say 15 Years of Operation Period
D)	Construction period (in number of years/ ½ years)	*
E)	Construction scheduling during the construction period (in %, in financial years/ financial half years)	*
F)	Total length of highway stretch in km	*
G)	Flexible pavement out of total length	*
H)	Rigid pavement out of total length	*
I)	Construction Start Date	Based on the date of project preparation and time lines as specified in the Model RFP documents.

** As assessed by the Technical Consultant in the Cost Estimate/DPR and approved by the Authority.*

6.4.2 *Assumptions that may be followed for carrying out the financial modelling*

Sl. No.	Item	Assumptions proposed for HAM
1)	Construction Cost	As per Cost Estimate prepared by Technical Consultant and approved by the Authority which is escalated by 5% per FY upto the start of construction.
2)	Contingencies	1% of Construction Cost

Sl. No.	Item	Assumptions proposed for HAM
3)	IC/ preoperative expenses	1% of EPC Cost [EPC Cost to be sum of Civil Construction Cost, Escalation and Contingencies
4)	Financing cost:	EPC Cost upto Rs.500 Crore: 2% of Debt EPC Cost (Rs.500 Cr to Rs. 1000 Cr): 1.5% of debt EPC Cost > Rs. 1000 Crore: 1% of Debt
5)	Rate of Interest:	RBI Bank Rate + 3%
6)	Debt Equity Ratio	70 : 30
7)	Equity Drawdown	25% upfront equity contribution and balance in proportion to debt
8)	Debt drawdown	After spending the upfront equity
9)	Periodic Maintenance	For Flexible Pavement: • Say Rs.35 lacs/km/6 year for 2011-12 for 4 lane road • Say For Two laning 60% and for six lane 150% of the cost is considered • Say Nil for Rigid pavement
10)	Routine Maintenance	• Say Rs.3.50 lacs/km/Year for Flexible pavement for 4 lane road • Say Rs.4.00 lacs/km/year for Rigid Pavement • (Say For Two laning 60% and for six lane 150% of the cost is considered) (In year of periodic maintenance, Routine maintenance is not considered)
11)	Other office expenses	• Say Rs.2.50 cr/ year. • (Say For Two laning 60% and for six lane 150% of the cost is considered)
12)	Electricity & Patrolling expenses	• Say Rs.1.25 lacs/km/year. • (Say For Two laning 60% and for six lane 150% of the cost is considered)
13)	Insurance	0.15% of TPC/year
14)	Inflation on above expenditure (except insurance)	5% per year
15)	Income Tax Rate	As per rates prevailing at the time of carrying out financial analysis.

Sl. No.	Item	Assumptions proposed for HAM
16)	MAT Rate:	As per rates prevailing at the time of carrying out financial analysis.
17)	Tax holiday (80 IA)	No Tax Holiday as per Finance Act 2016.
18)	Door to Door Loan Tenure	13 years
19)	Moratorium period for Loan Repayment	Construction Period plus 6 Months
20)	Loan repayment period	Balance period (Loan Tenor minus Moratorium period), to be paid semi-annually in equal instalment.
21)	Depreciation period	Concession period minus Construction Period
22)	Treatment of expenditure on development of highway	Treatment of expenditure incurred on development of highway in BOT mode under Income Tax Act, 1961: As per Section 35 AD.
23)	SLM Depreciation	Equally divided in whole depreciation period keeping 5% as Salvage Value as per Companies Act, 2013.

Above parameters are based on the guidelines issued by the NHAI. Authority are expected to have realistic assessment and can modify the parameters indicated above.

Based on the aforesaid Inputs and Assumptions, an analysis is to be carried out in order to assess the expected Bid Project Cost at a fixed benchmark which is 15% Equity IRR.

It needs to be recognized in case of any changes in the assumptions/project parameters used for developing the financial analysis, the project financial parameters are likely to undergo a change that might significantly impact the potential (adversely / favorably) of developing the project on Hybrid Annuity mode.

6.4.3 *Illustration for Financial Analysis on Hybrid Annuity Model (HAM)* **(Fig. 6.1)**

Project Description: A project highway is to be developed on HAM with the following salient features:

- Length - 75 km
- Pavement type - flexible
- Lane configuration - 4 lane road
- Civil cost - INR 1500 Cr

- Construction Period - 2. 5 years
- Operation Period - 15 years

Carry out the financial analysis on Hybrid Annuity Model:

1. **Step 1 (Understanding of Payment structure of HAM):** It is important to understand the payment structure of the Hybrid Annuity Model before carrying out the financial modelling exercise.

   Article 23 "PAYMENT OF BID PROJECT COST" of the Draft Concession Agreement for **PUBLIC PRIVATE PARTNERSHIP IN HYBRID ANNUITY PROJECTS** should be referred and understood well. This chapter explains the payment structure and some terminologies like:

   a) Bid Project Cost (BPC)

   Reproduced from Article 23.1 DCA: The Parties expressly agree that the cost of construction of the Project, as on the Bid Date, which is due and payable by the Authority to the Concessionaire, shall be deemed to be Rs..... (Rupees.....) (**The "Bid Project Cost**")[2]. The Parties further agree that the Bid Project Cost specified here in above for payment to the Concessionaire shall be inclusive of the cost of construction, interest during construction, working capital, physical contingencies and all other costs, expenses and charges for and in respect of construction of the Project, save and except any additional costs arising on account of variation in Price Index, Change of Scope, Change in Law, Force Majeure or breach of this Agreement, which costs shall be due and payable to the Concessionaire in accordance with the provisions of the Agreement. For the avoidance of doubt, the *Bid Project Cost specified herein represents the amount due and payable by the Authority to the Concessionaire and may be less than, equal to, or more than the Estimated Project Cost.*

   b) Adjusted BPC

   Reproduced from Article 23.2 DCA

   23.2.1 The Bid Project Cost specified in Clause 23.1 shall be revised from time to time in accordance with the provisions of this Clause 23.2 to reflect the variation in Price Index occurring after the Reference Index Date immediately preceding the Bid Date.

   23.2.2 The Bid Project Cost adjusted for variation between the Price Index occurring between the Reference Index Date preceding the Bid Date and the Reference Index Date immediately preceding the Appointed Date shall be deemed to be the Bid Project Cost at commencement of construction.

[2] Bid Project Cost shall be the amount specified in the Bid of the selected Bidder.

23.2.3 For every month occurring after the Appointed Date, the Authority shall compute the variation in Price Index occurring between the Reference Index Date preceding the Bid Date and the Reference Index Date preceding the date of Invoice, and shall express the latter as a multiple of the former (the "**Price Index Multiple**"). All Invoices to be submitted by the Concessionaire to the Authority for and in respect of the Construction Period shall be the product of the relevant proportion of the Bid Project Cost and the Price Index Multiple applicable on the date of Invoice. For the avoidance of doubt and by way of illustration, if (a) the Price Index on the Reference Index Date preceding the Bid Date, say January 31, 2016, is 200 (two hundred); (b) the Invoice is submitted on October 15, 2017; and (c) the Price Index as on September 30, 2017 is 210 (two hundred and ten), then the Price Index Multiple for determination of the amount due in respect of such Invoice shall be 1.05 (one point zero five).

c) Payment of Bid Project Cost

Reproduced from Article 23.3 DCA:

23.3.1 [40% (forty per cent)] of the Bid Project Cost , adjusted for the Price Index Multiple, shall be due and payable to the Concessionaire in 10 (ten) equal installments of [4% (four per cent)] each during the Construction Period in accordance with the provisions of Clause 23.4.

23.3.2 The remaining [60% (sixty per cent)] of the Bid Project Cost, shall be due and payable in [30 (thirty)] biannual instalments commencing from the 180th (one hundred and eightieth) day of COD in accordance with the provisions of Clause 23.6.

d) Payment during construction period

Reproduced from Article 23.4 DCA:

Upon receiving a report from the Independent Engineer certifying the achievement of the below mentioned Payment Milestones[3], the Authority shall disburse, within 15 (fifteen) days of the receipt of each such report, an instalment equal to 4% (four per cent) of the Bid Project Cost, adjusted for the Price Index Multiple as applicable on the Reference Index Date preceding the date of that report.

For the purpose of this Clause 23.4, the Payment Milestone for release of payment during Construction Period shall be as under:

a) I (first) Payment Milestone - On achievement of 5% Physical Progress

[3] Independent Engineer, during finalization of design, shall upfront decide weightages of all the items in due consultation with the Authority responsible for making payments and recommended percentage physical progress achievements based on the above decided weightages for the entire construction period. The weightages shall be fixed as per format in **Annexure – I** of **Schedule G** of this Agreement.

b) II (second) Payment Milestone - On achievement of 10% Physical Progress

c) III (third) Payment Milestone - On achievement of 20% Physical Progress

d) IV (fourth) Payment Milestone - On achievement of 30% Physical Progress

e) V (fifth) Payment Milestone - On achievement of 40% Physical Progress

f) VI (sixth) Payment Milestone – On achievement of 50% Physical Progress

g) VII (seventh) Payment Milestone – On achievement of 60% Physical Progress

h) VIII (eighth) Payment Milestone – On achievement of 70% Physical Progress

i) IX (ninth) Payment Milestone – On achievement of 80% Physical Progress

j) X (tenth) Payment Milestone – On achievement of 90% Physical Progress

Provided that in case of Change of Scope, the Physical Progress shall be recalculated to account for the changed scope.

e) Annuity Payments during operation period

Reproduced from Article 23.6 DCA:

23.6.1 The (the **"Completion Cost"** shall be the summation of A, B, C, D, E, F, G, H, I, J and K below:

A) 5% of the Bid Project Cost adjusted for the Price Index Multiple as applicable on the Reference Index Date preceding the date of report confirming 5% Physical Progress.

B) Another 5% of the Bid Project Cost adjusted for the Price Index Multiple as applicable on the Reference Index Date preceding the date of report confirming 10% Physical Progress.

C) Another 10% of the Bid Project Cost adjusted for the Price Index Multiple as applicable on the Reference Index Date preceding the date of report confirming 20% Physical Progress.

D) Another 10% of the Bid Project Cost adjusted for the Price Index Multiple as applicable on the Reference Index Date preceding the date of report confirming 30% Physical Progress.

E) Another 10% of the Bid Project Cost adjusted for the Price Index Multiple as applicable on the Reference Index Date preceding the date of report confirming 40% Physical Progress.

F) Another 10% of the Bid Project Cost adjusted for the Price Index Multiple as applicable on the Reference Index Date preceding the date of report confirming 50% Physical Progress.

G) Another 10% of the Bid Project Cost adjusted for the Price Index Multiple as applicable on the Reference Index Date preceding the date of report confirming 60% Physical Progress.

H) Another 10% of the Bid Project Cost adjusted for the Price Index Multiple as applicable on the Reference Index Date preceding the date of report confirming 70% Physical Progress.

I) Another 10% of the Bid Project Cost adjusted for the Price Index Multiple as applicable on the Reference Index Date preceding the date of report confirming 80% Physical Progress.

J) Another 10% of the Bid Project Cost adjusted for the Price Index Multiple as applicable on the Reference Index Date preceding the date of report confirming 90% Physical Progress.

K) Another 10% of the Bid Project Cost adjusted for the Price Index Multiple as applicable on the Reference Index Date preceding the COD.

The Parties acknowledge and agree that the Authority has paid a portion of the Completion Cost as payments during Construction Period pursuant to Clause 23.4 of this Agreement. The balance Completion Cost remaining shall be due and payable during the Operation Period in accordance with the provisions of Clause 23.6.2.

23.6.2 The Completion Cost remaining to be paid in pursuance of the provisions of Clause 23.6.1 shall be due and payable in biannual installments over a period of 15 (fifteen) years commencing from COD, (the **"Annuity Payments"**). The 1st (first) instalment of Annuity Payments shall be due and payable within 15 (fifteen) days of the 180th(one hundred and eightieth) day of COD and the remaining installments shall be due and payable within 15 (fifteen) days of completion of each of the successive six months ("the **Annuity Payment Date"**). For the avoidance of doubt, the last Annuity Payment Date would be adjusted to in such a way that it falls at the end of the Operations Period.

23.6.3 Each of the Annuity Payments due and payable during the years following the COD shall be as under[4]:

[4] The schedule may be customized based on the duration of the Operations Period

Annuity following the COD	Percentage of Completion Cost remaining to be paid on COD
1st Annuity	2.10%
2nd Annuity	2.17%
3rd Annuity	2.24%
4th Annuity	2.31%
5th Annuity	2.38%
6th Annuity	2.45%
7th Annuity	2.52%
8th Annuity	2.60%
9th Annuity	2.68%
10th Annuity	2.76%
11th Annuity	2.84%
12th Annuity	2.93%
13th Annuity	3.02%
14th Annuity	3.11%
15th Annuity	3.20%
16th Annuity	3.30%
17th Annuity	3.40%
18th Annuity	3.50%
19th Annuity	3.61%
20th Annuity	3.72%
21st Annuity	3.83%
22nd Annuity	3.94%
23rd Annuity	4.06%
24th Annuity	4.18%
25th Annuity	4.25%
26th Annuity	4.25%
27th Annuity	4.44%
28th Annuity	4.71%
29th Annuity	4.75%
30th Annuity	4.75%

Each of the biannual instalments payable hereunder shall be paid along with interest as specified in **Clause 23.6.4**

23.6.4 Interest shall be due and payable on the reducing balance of Completion Cost at an interest rate equal to the average of one year MCLR of top 5 Scheduled Commercial Banks[5]plus 1.25%. Such interest shall be due and payable biannually along with each installment specified in Clause 23.6.3. For the avoidance of doubt and by way of illustration, the Parties agree that interest on the Completion Cost remaining to be paid, calculated from COD and until the 180th (one hundred and eightieth) day of COD, shall be due and payable to the Concessionaire along with the first Annuity Payment and interest on **[6]% (** per cent) of the Percentage of Completion Cost remaining to be paid on COD, calculated from first Annuity payment date and until the 1st (first) anniversary of COD, shall be due and payable along with the second Annuity Payment due and payable under this Agreement. The Parties further agree that interest shall be calculated based on the number of days a particular average of one year MCLR of top 5 Scheduled Commercial Banks was applicable during the period of calculation. For the purpose of illustration, assuming that the balance capital cost remaining to be paid is Rs 100 crores on the 1st Annuity Payment Date, the applicable average of one year MCLR of top 5 Scheduled Commercial Banks for the first 75 days is 8% and thereafter it is revised to 7.5% and remains unchanged till the 2nd Annuity Payment Date, the interest would be calculated as ((100 *9.25%*75)/365)+((100*8.75%*105)/365). For the avoidance of doubt[7], the Interest would be calculated on simple interest basis and no compounding of the same would be undertaken.

f) O&M payments

Reproduced from Article 23.7 DCA:

23.7.1 The Parties acknowledge and agree that all O&M Expenses shall be borne by the Concessionaire and in lieu thereof; For the performance of its Maintenance obligations, a lump sum financial support in the form of biannual payments shall be due and payable by the Authority:

a) For flexible perpetual pavement including structures: no maintenance charges shall be paid for the first year; 0.40% of the Bid Project Cost each for the second, third and fourth year; 0.60% of the Bid Project Cost each for the subsequent years till laying of the renewal layer or end of concession period, whichever is earlier. The requirement for the renewal layer shall be worked out based on the survey and investigation of the

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5 The authority shall declare the list of Top 5 Scheduled Commercial Banks on 1st September every calendar year based on the balance sheet size as declared in their annual reports. The 1 year MCLR of the top 5 scheduled commercial banks shall be taken at the start of every quarter.

6 To be finalized on the basis of the outstanding Completio n Cost Annuity pursuant to the payment of 1st Annuity as provided in the Annuity payment schedule in Clause 23.6.3

7 Assuming that the total number of days between 1st Annuity payment date and 2nd Annuity date are 180. In case the number of days are different the calculation may be appropriately changed

existing pavement and the cost of such renewal works shall be made separately to the Concessionaire @ 2.4% of Bid Project Cost. After laying of the renewal layer, the Concessionaire shall be paid @ 0.40% of the original Bid Project Cost each for the next four years and @ 0.60% of the original Bid Project Cost each till laying of the second renewal layer or end of concession period, whichever is earlier. After laying of the renewal layer, the Concessionaire shall be paid @ 0.40% of the original Bid Project Cost each for the remaining years till the end of concession period.

b) For rigid pavement including structures: no maintenance charges shall be paid for the first year; 0.20% of the Bid Project Cost each for the second, third & fourth year, 0.40% of the Bid Project Cost each for fifth, sixth, seventh & eighth year, 0.60% of the Bid Project Cost each till the end of concession period

c) For stand-alone Bridge/ Tunnel works: the concessionaire shall be paid nomaintenance charges shall be paid for the first year; 0.20% of the Bid Project Cost each for the next five years, 0.40%of the Bid Project Cost each for the remaining years till the end of concession period.

The Parties further acknowledge and agree that any O&M Expenses in excess of the O&M Payments shall be borne solely by the Concessionaire, save and except as expressly provided in this Agreement. For avoidance doubt it is clarified that the O&M Payments will be subject to any Change Scope of the Project of the Concessionaire under Article 16 of this Agreement.

23.7.2 Above amount for the performance of Contractors' Maintenance obligations shall be, inclusive of all taxes. The amount payable for maintenance shall be adjusted on account of variation of Price Index. It is further agreed that the Bid Project Cost hereunder shall be reckoned with reference to the amount specified in Clause 23.1, which shall be adjusted to the extent of Change of Scope and Reduction in Scope, but shall not include any price adjustments in pursuance of variation of Price Index.

2. **Step 2 (Understanding of Bid Variables):** It is important to understand the bid variables:

The Bidding parameter consists of Bid Project Cost (BPC) (refer **Appendix-IB** of RFP).

Bids would be evaluated on the basis of the lowest Bid Project Cost. The Concession Period is pre-determined. The Bid Project Cost shall constitute the sole criteria for evaluation of bids.

3. **Step 3 (Preparing the assumptions sheet):** All the input variables should be presented in a separate excel sheet with appropriate colour codes. These inputs shall be linked to the various calculations flowing in other sheets.

In the input sheet, capturing following assumptions is a good practice:

- Highway Details:
  - Road Inventory: (Lane, length and pavement type)
- Civil Construction Cost
- Construction phasing
- Concession Period: (Construction Period & Operation Period)
- Bid due date
- Opex assumptions
- Periodic maintenance (Periodicity)
- Inflation Assumptions
- Taxation assumptions (Corporate Tax, MAT)
- Financing Assumptions:
  - Debt-Equity Ratio
  - Cost of debt
  - Cost of equity
  - Upfront equity
  - Loan assumptions (Door to door tenor, Moratorium)
  - Repayment type (equal installments, custom repayment plan)
- Scenario analysis:
  - Bonus for early completion
  - Penalty for delays

Project Salient Features	
	Length (kms)
2 Lane	0
4 Lane	50
6 Lane	0
8 Lane	0
10 Lane	0
EPC Cost (in Cr)	1000.00
Sensitivity of Civil Costs	0%
Construction Period (in years)	2.5
Operation Period (in years)	15
Concession Period	17.5
Bid Due Date	19-03-2019
Time for financial close (in days)	150
Pavement type	Flexible
Select Scenario: (Scheduled/Delay/ Early Completion)	Scheduled

Delays in COD		
Delays in COD	0	
Days after which delay in COD attacts penalty	90	DCA 15.2
Penalty (as a % of PS/ day)	0.2%	DCA 15.2
Delay on account of	Concessionaire	

Bonus (on early completion to COD)		
No. of days of early completion	0	
Minimum number of early completion for bonus eligibility	30	DCA 23.5
Bonus (Prorata: 0.5% X 60% X BPC for 30 days)	0.12	DCA 23.5

Opex Assumptions		
Routine Maintenance		2011-12 NHAI Assumptions
Lane Configuration	(Rs Cr per km)	(Rs Cr per km)
	2023	2012
2 lane	0.03	0.018
4 Lane	0.06	0.035
6 Lane	0.09	0.053
8 Lane	0.12	0.070
10 Lane	0.15	0.088

Periodic Maintenance		2011-12 NHAI Assumptions
Lane Configuration	(Rs Cr per km)	(Rs Cr per km)
2 lane	0.30	0.175
4 Lane	0.60	0.35
6 Lane	0.90	0.525
8 Lane	1.20	0.7
10 Lane	1.50	0.875

Fig. 6.1 Sample input sheet for HAM Model

4. **Step 4 (Calculating the Total Project Cost):** The total project cost should be calculated to figure out the cash outflow. Based on the cost estimation, the financing requirements shall be calculated simultaneously **(Table 6.1)**.

Table 6.1 Illustration for TPC Calculation in HAM

1	Civil Construction cost	1000
2	Escalation	50.00
3	Contingency expenses @ 1% Total civil cost	10.5
4	**Total EPC cost (1+2+3)**	**1060.5**
5	IDC	55.37
6	IC/Pre-Operative Expenses	10.61
7	Financing Charges @1% of debt[8]	4.33
8	Centages over EPC Cost (5+6+7)	**70.31**
	Estimated Project Cost (4+8)	**1130.81**

(in line with MORT&H Circular dated 10th August 2016)

5. **Step 5 (Calculating the Opex Cost):** The yearly operational expenditures shall be calculated using the assumptions made for:

- Routine Maintenance
- Periodic Maintenance
- Emergency Maintenance
- Special Repairs
- Other office expense
- Electricity and Patrolling Expense
- Insurance

6. **Step 6 (Forecasting of Revenue Stream):** In Hybrid annuity model, one of the major complexity lies in projecting the revenue stream, (Payment to be received by the Concessionaire from the Authority) the revenue stream is comprised of four items:

[8] The debt is calculated based on the financing assumptions (debt to equity ratio, BPC, interest rate, etc). Financing charges is 1% of debt for projects with EPC cost > 1000 Cr

Construction Support (paid during Construction Period)

- Dependent on: The Bid Project Cost (BPC)
- Disbursed 10 equal instalments, 40% of the BPC adjusted for index multiple (23.3.1 DCA)

Annuity Payment (paid during Operation Period)

- Dependent on: The Bid Project Cost (BPC)
- Disbursed in 30 annuity payments paid bi-annually

Interest Payments (paid during Operation Period)

- Dependent on: The Bid Project Cost (BPC)

Q&M Payments (paid during Operation Period)

- Disbursed in 30 bi-annual installment as % of BPC as per clause 23.7.1 of CA

These above mentioned revenue streams are dependent Bid Project Cost quote of the Successful Bidder.

CHAPTER 7

VALUE FOR MONEY (VFM) ANALYSIS

This section has been taken from PPP Guide for Practitioners, Department Of Economic Affair Ministry of Finance Government of India, April 2016 & Value-for-Money Analysis- Practices an Challenges: How Governments Choose When to Use PPP to Deliver Public Infrastructure an Services, Report from World Bank Global Round-Table 28 May, 2013, Washington DC; Worl Bank Institute (WBI) and Public-Private Infrastructure Advisory Facility (PPIAF)

7.1 Introduction

Public Private Partnerships (PPPs) are recognised world over as a tool to deliver modern sustainable and reliable infrastructure services. In PPP models, private party bears significan risk and management responsibility and hence, such partnerships can help make the best us of the resources of both the public and private sectors - including finance, experience, expertise The potential to achieve greater "value for money" is one of the important factors in using PPI model over other models of infrastructure delivery. In this regard, Value for Money (VFM) ca be defined as a measure of quality that assesses the monetary cost of the product or servic against the quality and/or benefits of that product or service, taking into account subjectiv factors such as fitness for purpose, along with whole-of-life costs such as installation, training maintenance and disposal etc.

In case of PPP, it may provide value for money compared to traditional models if the advantage of private sector experience, innovation and risk transfer outweigh the increased costs c contracting and financing in these models. Assessment of value of money for different models ca be termed as VFM analysis. VFM analysis is a combination qualitative and quantitative analysi which plays a central role in decisions on investment prioritization, selection, and presentatio of the choice of procurement approach. It is conducted in order to ascertain whether the projec being developed through a PPP framework offers good value to the public entity and ultimatel to the general public. On receipt of bids from the private partners, the results of VFM analysis ar useful for examining whether the winning bid delivers value to the public entity.

A robust analysis can also be helpful in:

1) Optimizing the PPP structure and the underlying risk sharing arrangement – the analysi will help structure the PPP in terms of designing a risk allocation that is bankable affordable, and provides value to the public entity.

2) Assessing the impact of changes in the risk sharing arrangement; and

3) Establishing an acceptability threshold for bids

7.2 Qualitative VFM Analysis

Qualitative analysis takes place at a relatively early stage of PPP development and involves asking whether a proposed project is suitable and relevant for private financing. The purpose of the qualitative assessment is to subjectively test whether the objectives, service requirement and proposed structure of the project are likely to provide the private sector with enough scope to give the public entity and the end users value. The HM Treasury VFM Assessment Guide[9] lists a few factors that need to be considered while undertaking the qualitative analysis:

1) **Viability**: Assessing whether there are any efficiency, accountability or equity issues which demand that services are provided by the Government directly rather than through a PPP project. It also considers the extent to which the service requirements can be adequately captured in a contract-based approach, with a clear specification in output terms for the PPP to transfer risk effectively to the appropriate parties.

2) **Desirability:** Determining the relative benefits provided through different procurement routes, such as incentives and risk transfer in PPPs vis-à-vis the Government's lower cost of borrowing in conventional procurement. This requires an upfront consideration of the relative advantages and disadvantages associated with a long-term contractual relationship between the public and private sector, and the strength of the mechanisms that could be used to ensure that different benefits are realised.

3) **Achievability**: Gauging the level of likely market interest, the skills and capacity of the private sector, their appetite for risk, any lender constraints and whether the procuring Authority has enough capability to manage the complex processes involved.

The analysis must incorporate a broad discussion of the qualitative assessment of the project's value, with reference to each of the value drivers. As a minimum, all the issues identified should be addressed as part of this analysis. A useful tool for summarising the qualitative assessment is to adopt a scoring mechanism against each of the value drivers.

7.3 Quantitative VFM Analysis

Quantitative analysis involves comparing the value for money of a proposed PPP with a model of the project if implemented through traditional public procurement. It can include comparing the estimated fiscal cost of the PPP and of implementing the project under traditional public procurement, adjusting the fiscal cost comparison for the government's risk exposure in each case and tax implications, and assessing differences in socioeconomic benefits between the procurement and delivery models. Range of possible contractual structures can be assessed in VFM analysis including pure tolled concessions, different levels of availability payments, or design-build-finance models.

Quantitative Assessment involves estimation of the risk adjusted cost of delivering a project through the PPP mode as compared to the risk adjusted cost of delivering the same project

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9 Source: The HM Treasury VFM Assessment Guide.

through the traditional public procurement mode. The value analysis compares the estimated cost of procuring the project through traditional public procurement with the estimated cost of procuring it on a PPP basis.

The analysis is intended to contribute to an assessment of whether the PPP option presents value compared to a conventionally procured project. The quantitative assessment aims to

- Support the qualitative assessment of officials involved at the project level in determining value;
- Enable projects to make appropriate use of private capital, to justify explicit additional costs against the benefits achieved as a result of transferring risk to the private sector; and
- Enhance the data availability to Departments to support future procurements, and to be able to justify decisions taken in the context of Government policy.

7.3.1 *Methodological Issues in Quantitative VFM Analysis*

- Cost and revenue assumptions: the assumptions made on project costs under public and private options and the extent to which a PPP is assumed to achieve lower costs, through efficiency or innovation is challenging. The challenge is greater for countries with less PPP experience.
- Differences in project revenue assumptions between PPP and public procurement may also affect VFM results.
- The cost to government of project management and transaction implementation may differ between a PPP and traditional public procurement.
- Adjusting apparent cost advantages of implementation by a public body such as differences in cost of land acquisition by public and private entities can be challenging.
- There is variation in risk allocation in PPP and traditional models. Quantitative risk analysis is complex, and requires sophisticated financial modelling, as well as data on risk outcomes from previous projects to inform assumptions on probability distributions.
- Quantitative VFM analysis assumes that implementing a project as a PPP leaves project benefits unchanged. Any implication for quality or timeliness of service is left to qualitative analysis.
- Calculating the relative VFM of PPP or traditional government procurement options involves calculating the net present value (NPV) of government payments under each option. Since government cash flow profiles vary significantly between PPP and traditional procurement models, the discount rate applied can have a significant impact on the result of the VFM analysis.

7.4 Value Indicator

The Value for Money of projects analysis is determined by the value figure. This is the difference between the estimated cost of procuring the project through traditional procurement and the estimated cost of procuring private sector participation for any project. However, this provides just a single estimate under a set of assumptions.

Value figure shows that the extent to which, based on a particular PIRR, the net present value of the option of developing the project under a PPP framework is better (if the figure is positive) or worse (if the figure is negative) than the net present value of developing the project on its own by the public entity (Source: Value for Money Assessment Guide, HM Treasury).

7.5 Public Sector Comparator

An assessment of whether a PPP project offers value is an essential part of a PPP procurement process. To understand the costs of a traditional public-sector approach, Public Sector Comparator (PSC) is used to compare and understand the value proposition of projects. PSC is the hypothetical risk-adjusted cost if a project were to be financed, owned and implemented by a Government Agency.

7.5.1 *Purpose of PSC*

Public entities use the Comparator as a benchmark to help decide whether an alternative procurement method using private finance would offer better value to the public entity. Some of the key purposes of the PSC are:

- Encouraging the Government Agency to calculate full cost pricing at the initial stage of the project development
- Creating a uniform and consistent benchmark
- Taking decisions on implementation through PPP by demonstrating value to the public entity

7.5.2 *Components of PSC*

PSC is derived from the monetisation of the following factors:

1) Raw PSC (also referred as Whole of Life Cycle Cost): These include those risks that are retained and those which could be transferred to the private partner.
2) Competitive neutrality: Competitive Neutrality removes the net competitive advantages that would accrue to a Government business by virtue of its public sector ownership.
3) Retained Risk
4) Transferable Risk

PSC is calculated as the net present value (NPV) of a projected cash flow based on the appropriate discount rate for the public sector.

7.6 Timing of VFM Analysis

The timing of VFM analysis presents a trade-off between availability and accuracy of information. Information available is limited in early stages and impact of the analysis becomes limited later in the process as it becomes more difficult to change mode of implementation. Typically, qualitative analysis takes place earlier in the process, while quantitative analysis comes later. When the quantitative VFM analysis is done later in the process, the pressure to deliver the right result, and the cost of changing approach at later stages make quantitative VFM analysis a tool to rationalise earlier decision, than an actual decision-making tool.

Usually, VFM analysis is carried out twice during the project development process:

- Prior to deciding whether to develop the project through a PPP framework
- Before awarding the project to the preferred bidder.

7.6.1 *Initial Assessment*

An initial assessment is carried out as part of the project feasibility study, prior to in principle approval, to help the public entity determine the appropriate procurement strategy for the project before soliciting proposals from the private sector.

The objective of this initial assessment is to provide an indication as to whether a PPP project is likely to provide value as compared with a project which is developed by way of traditional public procurement.

Some of the key objectives of this assessment are to

1) Demonstrate that the initial decision to develop the project through a PPP is based on a need and option analysis and is valid for the project;
2) Verify whether appropriate risk transfer arrangements are achievable;
3) Direct the public entity early on, where project specific issues emerge indicating that a PPP is no longer likely to offer value, towards the possibility of using other procurement routes including switching to conventional procurement;
4) Provide feedback to improve the evidence base and potential for market management;
5) Provide improved cost estimates so that, as part of the feasibility study, the contracting Authorities can be confident that the project is affordable;
6) Test whether the PPP solution option has enough market interest;

7) Help ensure an efficient bid process is planned within a realistic time frame; and

8) Provide the tender evaluation team with a framework within which they can take decisions if the assessment should suggest that the market conditions are unfavourable.

Steps in Initial Value Proposition of Projects Test

a) Calculate the Public Sector Comparator (PSC) for the project

b) Check whether the PSC is greater than the shadow bid. A shadow bid is effectively the hypothetical estimation of what the private sector would bid in response to the bidding documents inviting private sector partners to develop a project (derived out of the financial feasibility analysis).

c) If the PSC is greater than the shadow bid, there is value in developing the project through a PPP framework

7.6.2 *Final Assessment*

The objective of the final analysis is to help the public entity to ascertain the value proposition achievable through the bids submitted by the private bidders.

When assessing the value offered by projects developed under the PPP framework, one must not rely solely on a straight comparison of a preferred bid to its PSC (explained later in the module). This comparison should never be regarded as a pass/fail test, but instead as a quantitative way of informed judgment. This is especially important where bids are very close to the value of the PSC. The assessment should also consider all the other relevant factors of bid evaluation including (but not exhaustively):

- The value to the public sector of the risk the private sector accepts through the proposed PPP arrangement;
- Any differences in service deliverables between the PSC and PPP bid; and
- The wider consequences to the public sector of first receiving service from a different date under the PPP as compared to that in the PSC.

Qualitative factors become particularly important either where the lowest private bids are close to the PSC or where an important consideration cannot be quantified for the PSC. Where Value Proposition of Projects decisions reflect the consideration of qualitative factors, these must be fully documented to leave a verifiable decision trail which can be used by the parties involved in the decision-making process.

To this end, it is important that the procurement team compiles a list of all the qualitative factors at an early stage. This may be developed in conjunction with the PSC to identify costs that could not be meaningfully quantified in the PSC.

Steps in Final Value Proposition of Projects Assessment Test:

- Check whether the PSC is greater than the preferred bid/best bid/final offer.
- If the PSC is greater than the preferred bid/best bid/final offer, then there is value in awarding the project to the preferred bidder (who submitted the preferred bid/best bid/ final offer)

In countries such as UK, VFM analysis is done at four key stages: at the overall program level, at project inception, prior to launch of public procurement, and prior to contract signature.

7.7 Challenges in VFM Analysis

One of the most common reasons for governments to turn to PPPs is to create fiscal space to enable accelerated implementation of infrastructure projects. However, under many PPPs, the full cost of the project is ultimately paid by government, hence, over the long term no fiscal space is created. Also, in several cases the decision whether to introduce PPPs may be influenced by political or social attitudes over fiscal or value for money considerations. In such cases VFM analysis may appear less relevant as a decision-making tool.

However, the VFM analysis is undertaken to support key decisions and should be conducted even if no fiscal support is required – for example, if the costs may be recovered through user charges - as there is an obligation to ensure that the charges users pay are fair and reasonable. This is particularly relevant to annuity-based payment schemes where a framework is needed to assess whether the right procurement route is being used given the alternative of more traditional procurement approaches.

The Value Proposition of Projects analysis has been criticized for an exclusive focus on quantitative analysis, which at time faces the following difficulties:

1) Inaccuracy/inadequacy of data
2) Incomplete identification of key risks
3) Lack of consensus on discount rates
4) Time inconsistency (post-analysis, inordinate delays in actual bidding)
5) Analysis may be very expensive
6) No robust public sector alternative/comparator
7) Difficulty in establishing an accurate PSC ex ante, where the public entity's expenditure is based upon distributed assets unlike ring-fenced costs as in cases where projects are developed under PPP framework.
8) The quantitative VFM analysis results are also perceived to be overly scientific at the expense of real judgment

To overcome these shortcomings, it is imperative that the analysis is done with due regard to the following considerations:

1) A balanced approach should be adopted in the assessment of value through a comparison of traditional procurement and PPP procurement.

2) The tendency for appraisers to be overly optimistic in estimating key parameters for PPP projects should be explicitly countered through empirical evidence of this "optimism bias" from past projects.

3) The quantitative comparison should be considered just one aspect of appraisal, to be used only in conjunction with a qualitative analysis that looks at a project's potential distributional effects and the track record of similar projects.

4) The focus should be on making good use of databases in estimating project costs.

7.8 Case Study: Madhya Pradesh Road Development Corporation

Madhya Pradesh Road Development Corporation (MPRDC)[10] acts as State Highway Authority in the state of Madhya Pradesh. It upgrades, constructs and strengthens the total length of State Highways. The concept of VFM was considered by MPRDC during conceptualization of annuity projects. Earlier, MPRDC was executing BOT (Toll) projects.

MPRDC conducted VFM analysis **(Table 7.1)** for 1520.03 km length of its projects with Total Project Cost (TPC) of $476.66 Million. BOT annuity mode of PPP was compared with traditional EPC mode. During VFM analysis of MDRs, 22% annuity for BOT (annuity) projects was envisaged. However, after bidding, the projects were awarded on annuity of 18.30% under BOT(Annuity) mode. Presents the parameters considered in VFM analysis and comparison for both the modes.

Table 7.1 VFM Analysis by MPRDC

Parameters	EPC	BOT - Annuity
Construction Cost	This kind of assumption may be reviewed by SGIRC and Convenor $595.80 Million (Escalation by 25%)	$476.66 Million (Including 25% of TPC for financing cost, contingency & other charges)
Construction Period	2.5 Years	1.5 Years
O & M Exp		
Routine Maintenance	0.004M$/km/p.a.	-
Periodic Maintenance	0.02M$//km/p.a.	-
Electricity & Patrolling	0.002M$/km/p.a.	-

10 Source: https://ppiaf.org/documents/3195/download

Parameters	EPC	BOT - Annuity
Interest	9.00%	13%
Debt/Equity Ratio	100	70/30
Funds Requirement	Immediately	6 months after COD
Discount Rate for NPV Calculation	15%	15%
Loan Repayment Period (in years)	10	10
Quality of Roads	Very Good	Very Good
Efficiency of private sector	Not availed	Availed
Technology	Traditionally applied	Latest available Doubtful unless initial cost is low SG IRC may review
Setting up of full infrastructure and staff	Required	Not required
NPV calculated	456.4 Mn $	401.23 Mn $
Value for Money (NPV of EPC – NPV of Annuity)	55.17 Mn $	

From above analysis, it was observed that in VFM analysis of 1520.03 Kms of roads having cost of $476.66 Million awarded on average annuity of 18.30% of TPC that

- NPV of Annuity model < NPV of EPC model
- Annuity model provides Value for Money
- Annuity model is Economic, Efficient & Effective

7.9 Conclusion

A clear understanding of risk is crucial to achieve value from a PPP and avoid poorly structured projects. In this sense, despite various challenges and methodological issues, the VFM test is useful as a project management process, rather than a highly statistical-based, rigorous analysis. Governments can use VFM analysis results to set a bottom line for price bidding, with a view to achieving VFM.

VFM analysis can be used to sense-check the decision to pursue the project, the proposed PPP structure, to understand whether implementing a project now as a PPP comes at a cost, and

to weigh this cost against the associated benefits. The right balance between qualitative and quantitative approaches can be achieved to meet some of the challenges in analysis. Better data is needed to be made available on PPP and major infrastructure investment project outturns. For systematic application of VFM analysis to all major infrastructure projects, to assess the best procurement option, it should be integrated with overall public investment planning.

ANNEXURE-1

Input Data for Financial Analysis

1) VDF Values:

Input VDF values of different vehicle types for each direction of all homogenous sections.

Type of Vehicles	Homogeneous Sections										Max VDF of all the Sections
	1		2		3		4		5		
	UP	Down	UP	Down	UP	Down	UP	Down	UP	Down	
LCV											
2-Axle Trucks											
3 Axle Trucks											
MAV											
Bus											

Source: Field Surveys / IRC:37

2. Traffic Growth Rates (State wise):

Input traffic growth rates of each vehicle type for all the states projects is passing through.

State-1:

Vehicle Type	2019-20	2021-25	2026-30	Beyond 2030
Two Wheeler				
Mini Bus				
Car				
2 Axle Truck				
3 Axle Truck				
Bus				
Multi Axle Truck				
LCV				

Source: Traffic Study & Growth Projections

State-2:

Vehicle Type	2019-20	2021-25	2026-30	Beyond 2030
Two Wheeler				
Mini Bus				
Car				
2 Axle Truck				
3 Axle Truck				
Bus				
Multi Axle Truck				
LCV				

**Source: Traffic Study & Growth Projections*

3. Traffic Homogeneous Sections:

Input starting and ending chainages for each section.

Section No.	Starting		Ending		Length (Km)
	Existing km	Place	Existing km	Place	
I					
II					
III					
IV					
V					

**Source: Section details from road inventory*

4. Traffic Details (AADT):

Input AADT for each vehicle type for all homogenous sections.

Type of Vehicles	Homogeneous Section wise				
	1	2	3	4	5
2 Axle					
3 Axle					
MAV (4 - 6 Axles)					
Bus					
LCV					
Mini Bus					
Car					
2 wheeler					
Animal cart					
Cycle					
Cycle Rickshaw					

**Source: Traffic Study*

5. Average Existing Carriageway and Shoulder Widths-Homogeneous Section Wise:

Input existing carriageway and shoulder details for each homogenous section.

Homogeneous Section	Existing Pavement Type	Existing CW Lane Configuration (SI/ IL/2L/4L/6L)	Design Length (Km)	Average Carriage way width (m)	Average Shoulder Width (m)	Climate Zone (Arid, Semi-Arid, Humid etc.)
1						
2						
3						
4						
5						

**Source: Road Inventory*

6. Geometry Details of Existing Road: (Homogeneous Section wise)

Input geometric details of existing road for each homogenous section.

Description	Section					
	1	2	3	4	5	Units
Rise+ Fall						m/km
No of rises + Falls						No./km
Average Super elevation						%
Average horizontal curvature						In deg/km
Posted speed limit						In km/h
Elevation of the road section above the mean sea level						m

**Source: Road Geometry Inventory*

7. Geometry Details of Proposed/Design Road: (Homogeneous Section wise)

Input geometric details of proposed road for each homogenous section.

Description	Homogeneous Section					
	1	2	3	4	5	Units
Rise+ Fall						m/km
No of rises + Falls						No./km
Average Super elevation						%
Average horizontal curvature						In deg/km
Posted speed limit						In km/h

**Source: Improvement Proposal*

8. Existing Pavement Condition- (Homogeneous Section wise):

Input existing pavement condition for each homogenous section.

Description	Homogeneous Sections					
	1	2	3	4	5	6
Condition at end of year						
Roughness (IRI-m/km)						
All structural cracks (%)						
Wide structural Cracks (%)						
Thermal Cracks (%)						
Raveled Area (%)						
No of potholes (No/Km)						
Edge break area (m2/km)						
Drainage condition (poor/fair/good)						

**Source: Pavement Condition Survey*

HS	Condition Year	Roughness IRI	Total Cracking	Ravelled Area (%)	Potholes	Edge Break	Rut
		(m/km)	Area (%) ACRA	ARV	(no./km)	(m^2/km)	Depth (mm)
1							
2							
3							
4							
5							

9. Existing crust composition: (Homogeneous Section wise)

Input existing crust composition for each homogenous section.

Type of Existing Crust Composition	Average Existing Crust Composition (mm)-homogeneous Section wise				
	1	2	3	4	5
BC/SDBC					
DBM/BM					
WMM/WBM					
GSB					

**Source: Pavement Condition Survey*

10. Input - Road Sections : Basic data of existing road

Input basic data of existing road.

Material Type	Current Surface Thickness (mm)	Previous Surface Thickness (mm)	Last Re-Construction/ New Construction Year	Last Rehabilitation Year	Base Thickness (mm)	Construction Period (Years)
Bituminous Concrete (BC)						

11. Cost Estimates:

Input cost estimates.

Description	Cost (Rs.)
Total Project Cost (125% of Civil Cost)	
Utility Shifting	
Land Acquisition Cost and Resettlement & Rehabilitation Cost	
Environmental Cost	
Total Capital Cost	

(The Official amendments to this document would be published by the IRC in its periodical, 'Indian Highways' which shall be considered as effective and as part of the Code/Guidelines/Manual, etc. from the date specified therein)

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